

**HYDRASYS LC**  
**TECHNICAL MANUAL**



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## **SECTION 1 : WARNING**

## **SECTION 1 : WARNING AND SAFETY NOTES**

Follow all warnings and instructions marked on or supplied with the instrument. This service manual includes all information and warnings necessary for reliable and safe operation and maintenance. If the instrument is used in any other way than that specified by the manufacturer, operator's safety may be compromised.

The instrument has been designed to be used indoors. It can temporarily be subjected to temperatures up to + 50°C and down to -10°C (e.g., during transportation and storage) without any adverse effects on its safe use.

Do not use the instrument near water or in wet locations.

Do not place the instrument on an unstable cart, stand or table. Otherwise personal injury or damage to the instrument might occur.

This instrument should be operated from the type of power source indicated on the instrument's label and in this instruction manual. Before switching the instrument on, check that the voltage setting corresponds to the main power source. If you are unsure of the type of power available, consult your local power company.

The instrument is equipped with a 3-wire grounding-type plug. The plug should only be connected to a grounded power outlet. Never use a ground adapter plug to connect the instrument to a socket lacking a ground connection terminal.

Never interrupt ground leads or disconnect the ground terminal inside or outside the instrument.

Use only fuses with appropriate rating value and of specified type. Make sure that the total amperage of all appliances plugged into the power outlet does not exceed the outlet protection.

If an extension cord is used with this instrument, ensure that the total instrument amperage rating does not exceed the extension cord power rating.

Disconnect the instrument from any power source before opening for testing, cleaning, adjustments, servicing or maintenance.

Do not remove any covers when the instrument is connected to the main power source as this may expose dangerous live terminals.

Never defeat interlock switches. They are provided to prevent access to unsafe areas.

Any adjustment, maintenance and servicing of an uncovered instrument without disconnecting it from power outlet must only be made by qualified and trained personnel, aware of the risks involved.

If it is believed that the instrument has been damaged and is unsafe, avoid using it and contact Sebia's authorized representative.

### **Manufacturer's Responsibility**

Sebia or Sebia's authorized representative are responsible only for defects in material and services if :

- Adjustments, alterations or servicing have been made by authorized personnel.
- Electricity supply is in accordance with instrument specifications.
- Instrument is used according to instructions.

The manufacturer is not responsible for damage from misuse, abuse, accident and disasters, improper return shipping, or adjustments, alterations and servicing done by unauthorized personnel.

The characteristics of HYDRASYS LC are described in this manual. SEBIA has the right to modify them without prior notice.

## **SECTION 2 : INTRODUCTION**



## **SECTION 2 : INTRODUCTION**

This totally new system has opened the way to automation of electrophoresis techniques on the Hydragel agarose gels. HYDRASYS LC is a multiparameter semi-automated instrument which performs any agarose gel electrophoresis that is available in the manual Hydragel series of tests (e.g., Serum Proteins, Immunofixation, Lipoprotein + Lp (a), Hemoglobins alkaline and acid, Hemoglobin A1c, Chol-HDL,...).

The automated electrophoresis steps are performed in sequence : sample application, migration, incubation, staining, destaining and drying. The manual steps include handling the samples and gels, and setting up the instrument for operation.

Sample application is performed in a particularly ingenious and original way. The excellent quality of the applications allows the protein fractions to resolve into sharp and distinct bands.

Migration parameters are regulated in constant current, constant voltage, constant power or volts x hour.

Staining, destaining and drying steps are performed in a leak-proof compartment with a capacity of up to four different reagents.

The HYDRASYS LC control panel is connected to an L.C.D. screen which can display menus, the working stages of each module and the progress of the ongoing procedural step. In addition, it displays messages, incidents and errors.

HYDRASYS LC should be used only with the specifically designed HYDRAGEL kits, gels and reagents manufactured and tested by SEBIA.

## **SECTION 3 : TECHNICAL SPECIFICATIONS**

## SECTION 3 : TECHNICAL SPECIFICATIONS

### SAMPLE APPLICATION

- Applicator : 7, 15 or 30 deposits
- Disposable microporous applicators
- Direct loading of 10 µL of biological fluid
- Automatic application controlled by the program

### MIGRATION

- Capacity for 40 migration programs
- Constant voltage, current, power or volts x hour
- Voltage : 3.5 to 350 V
- Current : 3.5 to 200 mA
- Power : 0 to 30 W
- Temperature controlled by Peltier effect
- Drying assisted by additional heating element (90 W)

### STAINING, DESTAINING, DRYING

- Capacity for 40 staining programs
- Teflon® coated molded aluminum compartment with 3 level detectors
- Entry/exit of liquids controlled by a 6 or 10-way valve
- Liquids circulate through a self-priming pump
- Drying by convection heater (600 W) with laminar air flow

### GENERAL SPECIFICATIONS

- Keypad with 20 keys + shift
- L.C.D., 4 lines of 40 characters
- Safety lid-locks on the migration and staining modules
- Test and control program
- Power : 1000 VA
- Voltage : 115/230 V ± 10 % (factory selected) - 50/60 Hz
- Fuses : 230 V / 2 x 6.3 A (slow blow)  
115 V / 2 x 10 A (slow blow)
- Dimensions : L 69 cm x W 52 cm x H 25 cm  
L 27.2 in x W 20.5 in x H 9.8 in
- Weight : 30 kg / 66 LB

## **SECTION 4 : GENERAL DESCRIPTION**

## SECTION 4 : GENERAL DESCRIPTION

### 4.1 EXTERNAL HARDWARE DESCRIPTION

It consists of :

- on the front panel (see figure 1 - section 4) :

- a migration module (1)
- a keypad with 20 keys + SHIFT (5)
- a L.C.D. with 4 lines of 40 characters (2)
- a staining / destaining / drying module (4)

- on the right panel (see figure 1 - section 4) :

- a 6 or 10-way valve (6)

- on the rear panel (see figure 2 - section 4) :

- an ON/OFF switch (3)
- an A.C. power source inlet with fuses compartment (1) (2)
- a waste overflow sensor inlet (4)
- a 9 pin connector (AUX) allowing to download a new software in Flash EPROM through a serial link (5) with the help of a lap top computer or HYRYS densitometer.

### 4.2 INTERNAL HARDWARE DESCRIPTION (see figures 1 to 13 section 10)

It consists of :

- on the left, migration cover open :

- a migration plate coated by a Teflon<sup>®</sup> film
- 2 electrodes (anode on the left and cathode on the right)
- a motorised cam used to move the applicator / electrode carriers
- a migration chamber fan (M7)
- a migration cover microswitch (M3)

- a safety electromagnet to lock the migration cover (M2)

- in the middle, rear cover and screen / keypad cover removed :

- a Main P.C. board (G11)

-on the right, rear cover and screen / keypad cover removed :

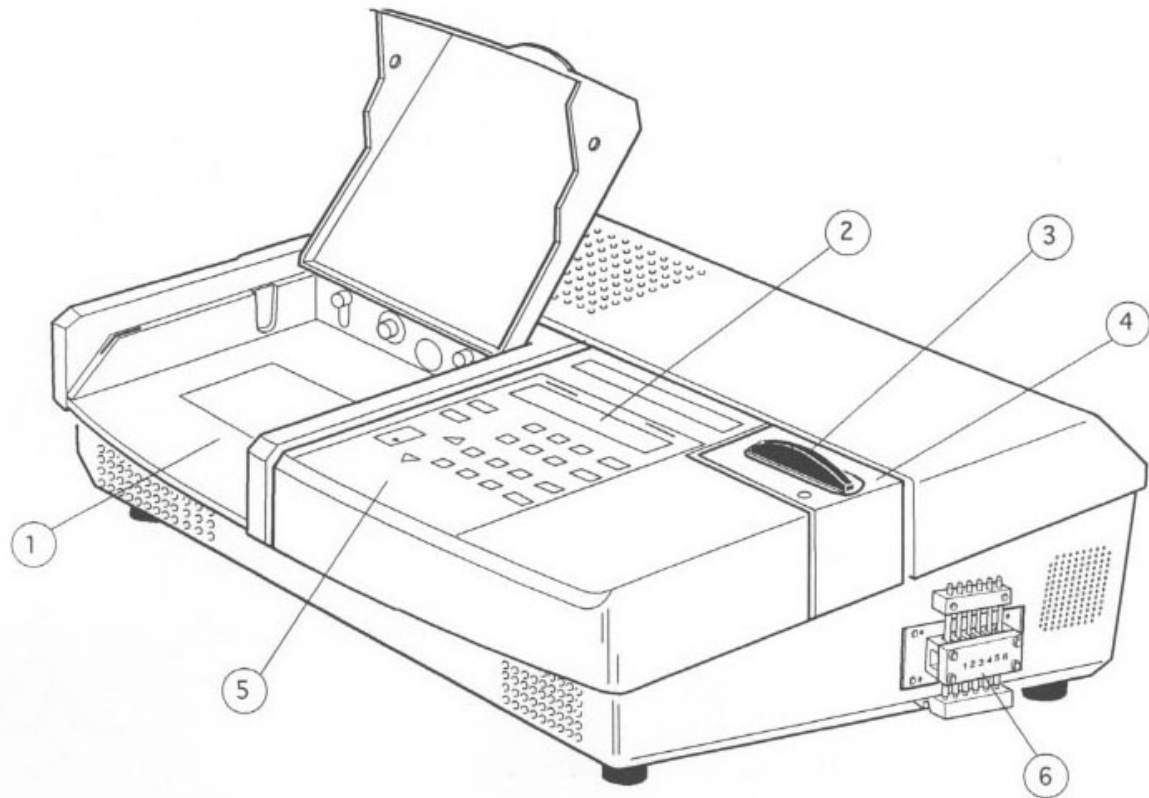
- a Teflon<sup>®</sup> coated molded aluminium staining tank (C1)
- 3 level probes (C3)
- an electromagnet to lock the gel holder (C2)
- a staining dryer P.C. board (C20)
- a heating element (C13)
- a fan (C7) with an airflow convector (C4) and (C5)
- a pinch valve (B4)
- a gear pump (G12)
- an 6 or 10-way valve (G7) with a valve P.C. board (V5)

- at the back, rear cover removed :

- a power supply module (G10)

#### 4.3 KEYPAD DESCRIPTION (see figure 3 - section 4) :

## THE INSTRUMENT'S FRONT PANEL (Fig. 1)



Rep. 1 : Module migration / Migration module

Rep. 2 : Ecran / Screen

Rep. 3 : Porte-Film / Gel holder

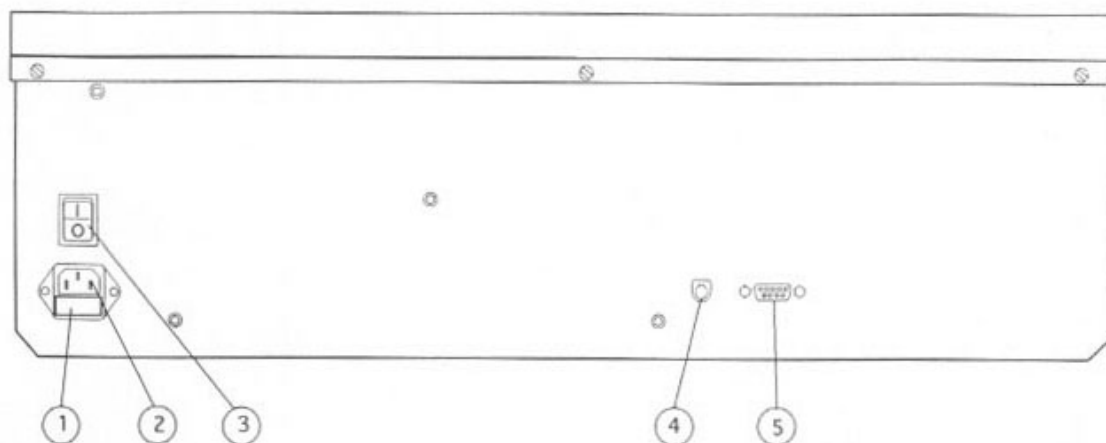
Rep. 4 : Module coloration / Staining module

Rep. 5 : Clavier / keypad

Rep. 6 : Vanne / Valve



## THE INSTRUMENT'S REAR PANEL (Fig. 2)



Rep. 1 : Compartiment Fusibles / Fuse compartment

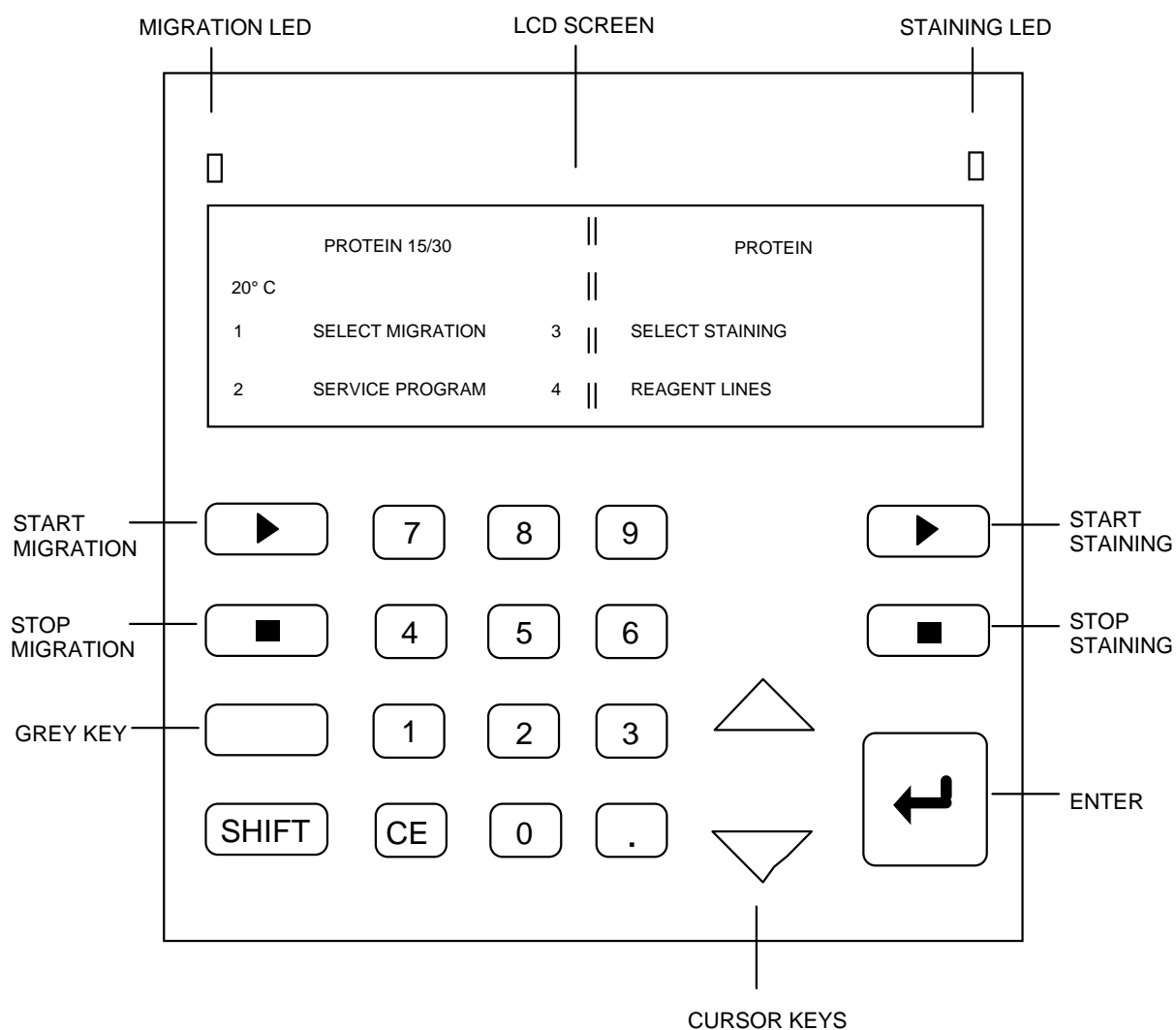
Rep. 2 : Entrée Cordon Secteur / Power source inlet

Rep. 3 : Marche/Arrêt / ON/OFF switch

Rep. 4 : Détecteur de vidange / Waste overflow inlet

Rep. 5 : Port série RS 232 C / RS 232 C serial port

## THE INSTRUMENT'S KEYPAD AND SCREEN (Fig. 3)

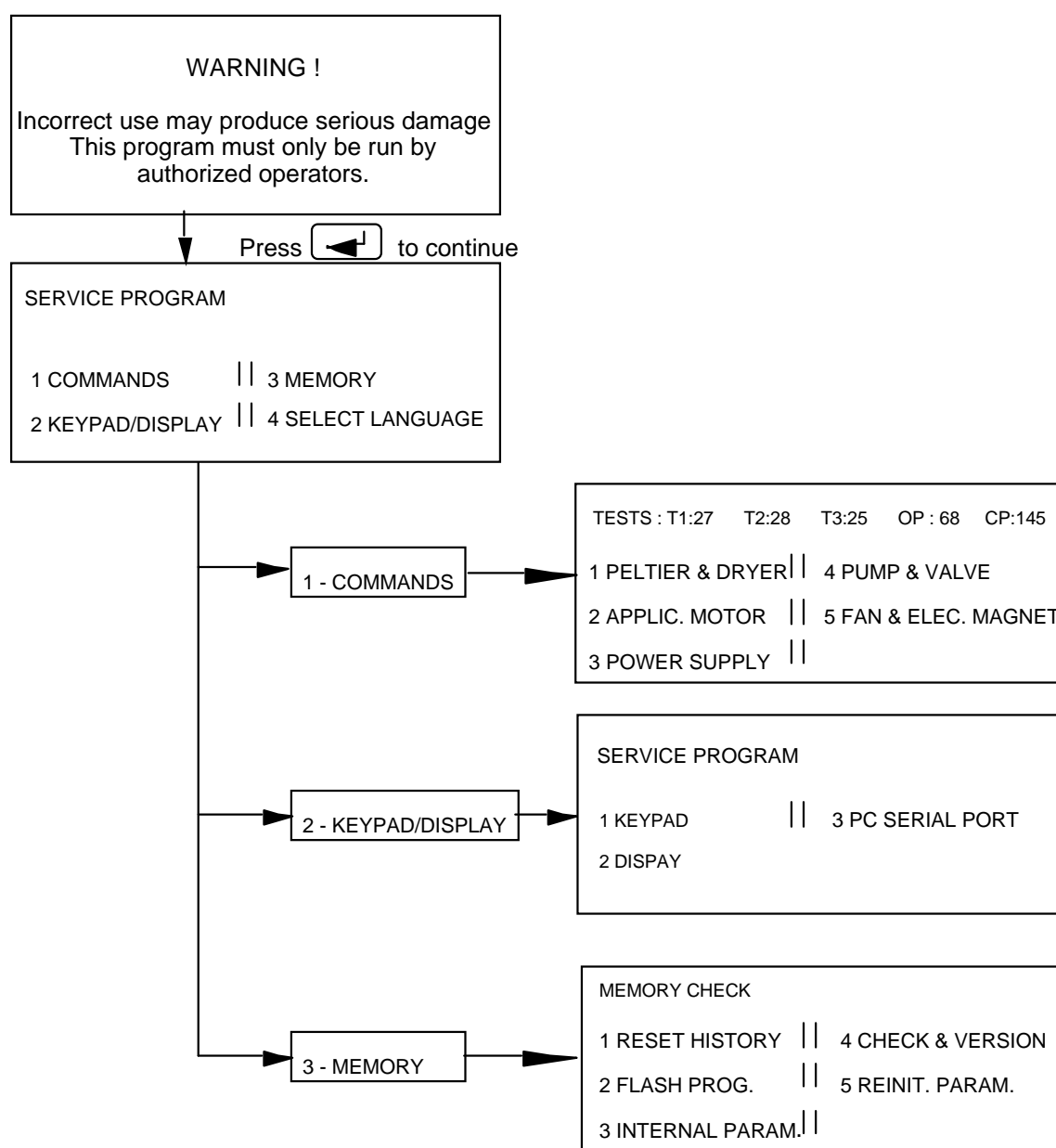


## **SECTION 5 : SERVICE PROGRAM**

## SECTION 5 : SERVICE PROGRAM







On the main menu, select 2 SERVICE PROGRAM and then a password (4644) must be entered.

When the Service Program is selected, the following warning message appears on the screen :




## 5.1 COMMANDS :

Test program used to control the different elements of the migration and staining modules.

	- PELT. & DRYER	:	Peltier effect and dryer commands
	- APPLIC. MOTOR	:	applicator/electrode carrier motor commands
	- POWER SUPPLY	:	migration power supply commands
	- PUMP & VALVE	:	pump and valve commands
	- FAN & ELEC. MAGNET	:	fan and electromagnet commands
		:	exit of tests

### Note :

When you exit by pressing , the instrument is initialized. If the pump and the valve have been used, the staining chamber is automatically drained to the waste container.

Information displayed during the tests :

T1 : migration plate temperature (top surface of the Peltier modules)  
T2 : radiator temperature (bottom surface of the Peltier modules)  
T3 : staining dryer temperature  
CP : analog input of the precise channel used to determine the temperature slope of the migration plate (value from 110 to 180)  
OP : offset of the precise channel (value from 45 to 65)

### 5.1.1 *Peltier and dryer commands* :

TESTS : T1:27    T2:27    T3:27    OP:58    CP:153				
1 ON/OFF MI. DRYER			3 ON/OFF ST. DRYER	
2 ON/OFF PELTIER			4 SET UP PARAM.	
MI DRY : 0			ST DRY : 0	
			PELTIER : 0	

ON/OFF MI. DRYER : ON/OFF Migration Plate Dryer

ON/OFF PELTIER : ON/OFF Peltier Effect

ON/OFF ST. DRYER : ON/OFF Staining Dryer

SET UP PARAM. : Allows to set up the working conditions for testing the Peltier effect and the 2 dryers

Working conditions :

MIGRAT. DRYER POWER ? migration dryer power (MI DRY) : power applied to the heating element (from 0 to 90 watts)

BATH DRYER POWER ? staining dryer power (ST DRY) : power percentage (conduction time of the triac) applied to the heating element. For safety reasons, do not exceed 80 %

PELTIER VOLTAGE ? Peltier voltage (PELTIER) : voltage applied to the Peltier modules (from 0 to 30 volts)

MODE (0=COOLING) ? functioning mode of the Peltier effect (0 = cooling / 1 = heating).

Note :

By default, the 3 parameters are programmed to 10 and the cooling mode is selected.

The "-" sign for the Peltier effect indicates cooling, the "+" sign indicates heating.

**WARNING :**

Peltier effect and dryer commands are 3 ON/OFF commands. This means that no regulation is effective, they are under control and responsibility of the operator. Never exceed 80°C for T1, T2 and T3 temperatures to prevent any damage.

### 5.1.2 Applicator/electrode carrier motor commands :

3 function keys are available to control the cam motor, the opto sensors and to adjust the applicator/electrode carrier.

- |              |   |
|--------------|---|
| <div>1</div> | ON/OFF APPLIC. : motor ON/OFF                   |
| <div>2</div> | HOME POSITION : motor goes to the home position |
| <div>3</div> | NEXT POSITION : motor goes to the next position |

Port bit status : the bits are numbered from 1 to 8 starting from the **right**

- 1 Application position opto sensor of the carrier (0 = application position)
- 2 Home position opto sensor of the carrier (0 = home position)
- 3 Not used
- 4 Waste container level (0 = full)
- 5 Valve home position opto sensor (1 = home position)
- 6 Staining gel holder opto sensor (1 = gel holder in the staining compartment)
- 7 Migration cover microswitch (1 = cover closed)
- 8 Not used

### 5.1.3 Power supply commands :

TESTS : V : 0			I : 0	R : 0.00
1 U : ?			3 ON/OFF P.S.	
2 I : ?				
P.S. : 0	CMD (V) : 0		CMD (mA) : 0	

3 function keys are available to control the migration power supply :

- |              |             |   |
|--------------|-------------|---|
| <div>1</div> | U = ?       | Allows to enter the voltage (V). Do not exceed 350V   |
| <div>2</div> | I = ?       | Allows to enter the current (mA). Do not exceed 200 mA  |
| <div>3</div> | ON/OFF P.S. | Allows to start and stop the power supply. When the power is on, the instrument continuously displays the voltage, the current and the load values. |

Values when migration power supply is selected :

U = Value in V

I = Value in mA

R = Calculated value of the load in K $\Omega$

Notes :

It is not possible to modify U and I when the power supply is on (first, stop the power supply and then, modify the working conditions).

The power supply can only work if the migration cover is closed (microswitch activated).

*5.1.4 Pump and valve commands :*

The accessible functions are spread on 2 screen pages. Go from one screen to the other by pressing 3 NEXT SCREEN

FIRST SCREEN :

First line : Values of the level probes (NTC thermistors) and position of the valve

- LL : Low Level
- ML : Medium Level
- HL : High Level  
values of level probes without liquid :  $70 \pm 10$   
values of level probes with liquid :  $150 \pm 20$
- LINE N : Position of the valve : from 1 to 6 or 1 to 10 according to the valve

- |   |                   |   |
|---|-------------------|---|
| 1 | VALVE ON/OFF      | : ON/OFF valve motor  |
| 2 | NEXT POSITION     | : next position of the valve  |
| 3 | NEXT SCREEN       | : allows to select the 2nd screen   |
| 4 | ON/OFF ASPIRATION | : ON/OFF pump filling under control of the operator to prevent any overflow of the tank |
| 5 | ON/OFF DRAINING   | : ON/OFF pump draining  |



6 PUMP SET UP : allows to set up the pump speed (value from 1 to 4) to drain or fill the tank

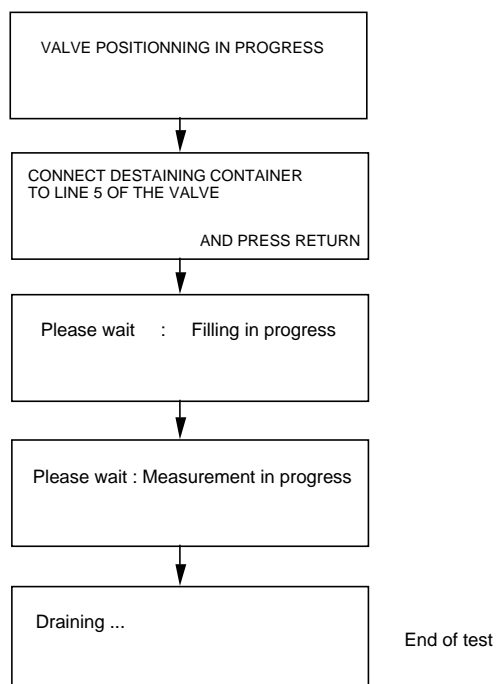
## SECOND SCREEN :

- |   |                    |   |
|---|--------------------|---|
| 1 | LINE & LEVEL       | : allows to select the line number and the tank filling level (1 = intermediate level, 2 = high level). Once the 2 parameters are validated, the valve goes automatically to the chosen line. |
| 2 | HOME POSITION      | : allows to select the home position of the 6 or 10-way valve   |
| 3 | NEXT SCREEN        | : allows to select the 1st screen   |
| 4 | FILL TANK          | : allows to fill the tank up to the defined level. During filling, pressing the key will stop the pump motor  |
| 5 | WASTE TANK         | : allows to drain the tank. During draining, pressing the key will stop the pump motor.   |
| 6 | PUMP CALIBRATION * | : allows to calibrate only the first model of gear pump (SEIM <sup>®</sup> model).  |

**This procedure must be performed after replacing the pump, the main P.C. board or downloading of a new software.**

It allows to calibrate automatically the maximum required pump current of the different cycles of the pump (aspiration, draining, agitation). Calibration parameters are stored in Internal Parameters (parameters 45 to 49).

Pump motor current control allows to stop the pump immediately to avoid disconnection of tubing in case of high pressure (error 60 during filling of the tank or error 61 during draining of the tank).



(\*) The new magnetic drive gear pump (MICROPUMP® model) does not need to be calibrated. When using this pump, the internal parameter setting should be the following (see § 5.3.3) : P9=1 , P45=200 , P46=200 , P47=200 , P48=200 , P49=200.

### 5.1.5 Fan and electromagnet commands

CE : 0	MF : 0	PF : 0	TE : 0	SF : 0	PV : 0
1 COVER ELEC. MAGNET		4 TANK ELEC. MAGNET			
2 MIGRATION FAN		5 STAINING FAN			
3 PELTIER FAN		6 PINCH VALVE			

Six function keys are available to control fans, electromagnets and pinch valve.

1	COVER ELEC. MAGNET	:	ON/OFF migration cover electromagnet
2	MIGRATION FAN	:	ON/OFF migration fan
3	PELTIER FAN	:	ON/OFF radiator fan of the Peltier modules
4	TANK ELEC. MAGNET	:	ON/OFF tank electromagnet
5	STAINING FAN	:	ON/OFF staining dryer fan
6	PINCH VALVE	:	ON/OFF pinch valve of the fluidic

Status of each element is displayed on the first line of the the screen : 1 = ON, 0 = OFF

CE = migration cover electromagnet  
MF = migration fan  
PF = radiator fan of the Peltier modules  
TE = tank electromagnet  
SF = staining dryer fan  
PV = pinch valve


## 5.2 KEYPAD/DISPLAY:

SERVICE PROGRAM

1 KEYPAD		3 PC SERIAL PORT
2 DISPLAY		


### 5.2.1 Keypad :

This test indicates the pressed key.

To exit the keypad test, press the  key for few seconds.

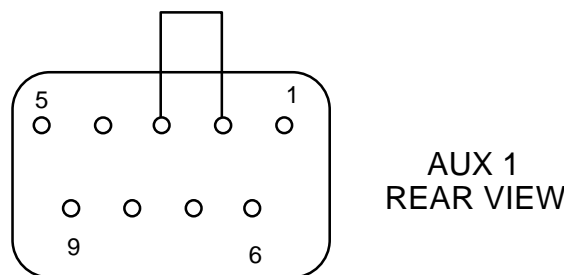
### 5.2.2 Display :

This test starts a graphic test followed by an alphanumeric test.

To exit the test, press  key.

### 5.2.3 PC Serial port .:

This test allows to check the RS232C serial port used to download the instrument. It can be started after having placed a jumper between pin 2 (RX) and pin 3 (TX) as shown below on the 9 pin connector (AUX 1).



The decimal ASCII code of the pressed key sent to the transmission output (TX) and received through the loop by the reception input (RX) is displayed as follows :

PC SERIAL PORT			
Press a key			
TRANSMITTED :	RECEIVED :	ERROR :	
49	1	49	1

To exit the test, press the  key.

Note :

This test allows to check the ACIA 6850 (IC 24) and the 2 input/output adaptors 1488 (IC 25) and 1489 (IC 26) on the mother P.C. board.

### 5.3 MEMORY :

MEMORY CHECK			
1 RESET HISTORY		4 CHECK & VERSION	
2 FLASH PROG.		5 REINIT. PARAM.	
3 INTERNAL PARAM.			

Test program used to reset the history, to download a new software, to check the memory and modify or reinitialize the internal parameters.

Note :

- Memory consists of a Flash MEMORY and a RAM.
- The Flash MEMORY is used to store the instrument software and the different migration and staining programs. The Flash MEMORY is also used to store the internal parameters, the heater temperature regulation parameters, the latest values of the 3 level probes and the staining cycle step in progress in case of power failure.

#### 5.3.1 *RESET HISTORY :*

This test allows to reset information stored in the Flash MEMORY such as the latest migration and staining programs selected, the heater regulation parameters, the latest values of the 3 level probes and the staining cycle step in progress in case of power failure.

When this test has been performed, the instrument runs automatically a draining cycle of the staining tank.

### 5.3.2 FLASH PROG.:

This test allows to download a new software version through the serial link with a PC or HYRYS densitometer.

When this test is selected and validated by pressing  CONTINUE, the instrument emits an intermittent beep and displays "SHUTTING DOWN" indicating that it is waiting for a new software downloading.

#### Note :

For more details to download a new software version, refer to the FLASH INSTRUCTION MANUAL.

If the test is selected by error, turn the instrument off to start from the beginning.

### 5.3.3 INTERNAL PARAMETERS :

Do not modify except the next parameters according to the instrument configuration :

- P9\* = 0 with the first model of gear pump (SEIM<sup>®</sup> model)  
= 1 with the new magnetic drive gear pump (MICROPUMP<sup>®</sup> model)
- P44\* = 6 with the 6-way valve  
= 10 with the 10-way valve
- P45 to P49 = pump calibration parameters with the first model of gear pump (SEIM<sup>®</sup> model), parameters set to 200 with the new magnetic drive gear pump (MICROPUMP<sup>®</sup> model).

(\* : as of software release 6.XX.XX).

### 5.3.4 MEMORY CHECKSUM AND VERSION :

This test allows to know the Flash memory checksum and the software version.

### 5.3.5 REINIT. PARAMETERS :

This test allows by pressing  CONTINUE to reinitialize the internal parameters. Then refer to § 5.3.3 to set the internal parameters according to the instrument configuration.

## 5.4 SELECT LANGUAGE :



This menu allows to select the user's language : French, English, German, Spanish, Portuguese or Italian.

## **SECTION 6 : SPECIAL FUNCTIONS**



## SECTION 6 : SPECIAL FUNCTIONS

### HIDDEN KEYS :

The special  key is necessary to activate the functions below. After having pressed the  key, one must press the additional two keys simultaneously shortly after.

 +   MIGRATION :

Allows to shorten the time of each migration cycle phase in process.

 +   STAINING :

Allows to shorten the time of each staining cycle phase in process.

 +   :

Allows to give access directly to the test program in case of error message, then enter password : 4644

 +   :

Resets the history and the instrument which starts up again and indicates "INCORRECT STOP" and thus drains the tank to the waste container.

**Warning** : do not use this function when the tank is full of staining solution because stain will be drained to the waste instead of to the staining container.

## **SECTION 7 : MECHANICAL ADJUSTMENTS**

## SECTION 7 : MECHANICAL ADJUSTMENTS

### 7.1 APPLICATOR / ELECTRODE CARRIER :

To perform the adjustment proceed as follows :

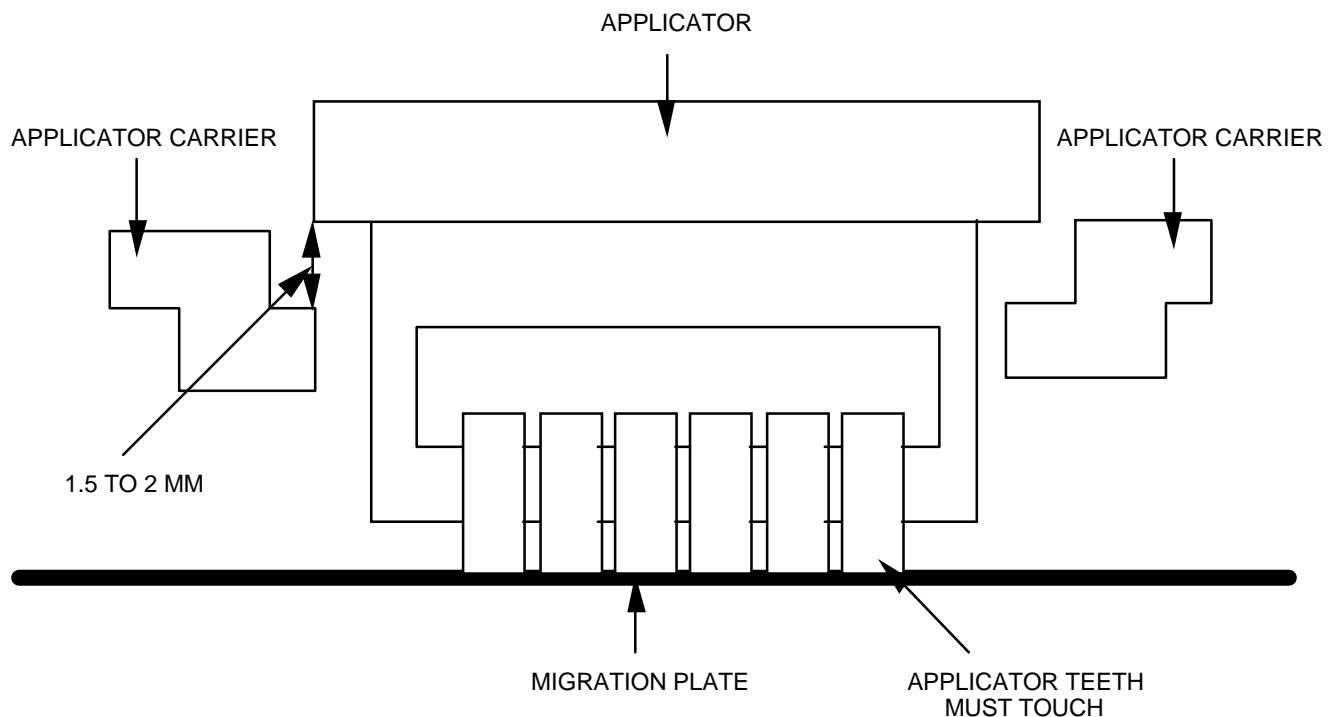
- turn the instrument on and let it finish its initialization
- select  Service Program and enter the password 4644, press
- COMMANDS and  APPLIC. MOTOR
- open the migration chamber cover and insert the side-lateral carrier into the lateral slots. The axis guides must slide into the slots without difficulty, right up to the end. If not, pivot one of the axis guide according to the other.
- make the carrier rise and fall with the  ON/OFF APPLIC. command.
- observe the movement of the carrier : it should be smooth and regular.

#### 7.1.1 *APPLICATOR CARRIER ADJUSTMENT*

Insert 2 applicators in position 1 and 13.

Put the carrier in the lowest position (application position) by pressing  NEXT POSIT.

Adjust the screw (front screw) on the applicator arm underneath the cam so that the carrier is horizontal (parallel to the migration plate) and that the 2 applicators are distant of 1.5 to 2 mm from the carrier on both sides as shown on the next page.



Once the adjustment is made, press  NEXT POSIT., make a complete cycle and check the 1.5 to 2 mm distance. If correct, block the lock screw with a flat wrench (5 mm).

Go to the intermediate position (migration position) by pressing  NEXT POSIT. and check that the applicator teeth are at least 4 mm above the migration plate.

Take out the applicators.

### 7.1.2 ELECTRODE CARRIER ADJUSTMENT

It consists of the rear electrode carrier (anode) adjustment.

Select the intermediate position (migration position) by pressing  NEXT POSIT.

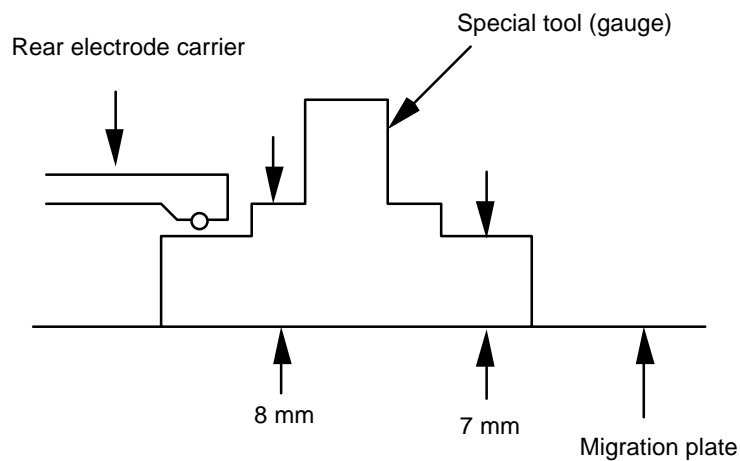
Adjust the screw of the electrode carrier (rear screw) underneath the cam so that there is more than 7 mm and less than 8 mm between the migration plate and the electrode. The edge (7 mm thickness) of the special tool (gauge) must pass under the electrode up to the 8 mm thickness.

Check the adjustment by making a complete cycle of the carrier.

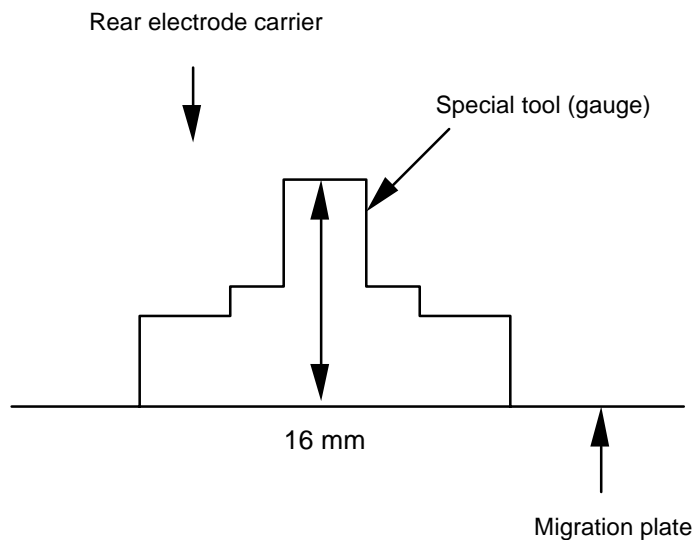
Select the high position of the carrier (home or drying position) by pressing 2 HOME POSIT. and pass the gauge between the rear electrode and the migration plate. The gauge must pass easily (more than 16 mm height). If correct, block the lock screw with a flat wrench (5 mm).

Press ← to exit.

Migration position :



Home position (drying position) :



Notes :

For both carriers, perform the adjustments without any gel on the migration plate.

There is no adjustment for the front electrode carrier (cathode).

Concerning the second adjustment (electrode carrier), the tolerance thickness of the sponges is  $10 \pm 2$  mm.

In migration position with less than 8 mm, the contact gel/sponge/electrode is perfect.

In drying position, with more than 16 mm there is no contact between the gel and the sponge.

## **SECTION 8 : DISMANTLING**

## SECTION 8 : DISMANTLING

This section describes the procedures to dismantle the instrument in order to check or to replace parts of the instrument. Proceed in the opposite way to reinstall the instrument.

Refer to Section 12 for the drawings.

**CAUTION** : To avoid electrical shock, make sure the instrument is disconnected from the A.C. power source before being opened.

### Required tools :

- slotted head screw driver : 4 mm
- Allen wrenchs : 1.5 mm - 2 mm - 2.5 mm - 3 mm
- Torx wrench : Torx 10
- Torque wrench : set to 56 cNm
- pliers
- cutting pliers
- soldering iron
- dust brush.

#### 8.1 REAR COVER (figure 3 - section 12):

Unscrew and remove the 3 screws (G22), pull to the back and remove the rear cover (G3).

#### 8.2 KEYPAD AND SCREEN COVER (figures 3, 8 and 9 - section 12)

- Remove the rear cover (see § 1)
- Unscrew and remove the 2 front screws (G16)
- Unscrew and remove the 2 rear screws used to fix the cover on the staining tank
- Lift slightly the cover (A1), unplug the connector J10 located on the main P.C. board.

#### 8.3 KEYPAD (figure 8 - section 12)

- Remove the rear cover (see § 1), the keypad and screen cover (see § 2)



- Unplug the keypad connector J2 located on the screen/keypad interface P.C. board
- Insert slightly a small blade at the bottom left corner of the adhesive keypad (G5) to unstick and remove it totally.

#### 8.4 FLUORESCENT SCREEN (figure 8 - section 12)

- Remove the rear cover (see § 1), the keypad and screen cover (see § 2)
- Unplug connectors J2 and J3 located on the screen/keypad interface P.C. board
- Unscrew and remove the 4 screws (A19) to separate the module from the cover.
- Unscrew and remove the 4 screws (A10) situated on the screen/keypad interface P.C. board.
- Unsolder the 2 wires (Black, Red) of the screen from the keypad interface P.C. board (+VLCD,0V5), then the screen is free.

#### 8.5 MAIN P.C. BOARD (figure 3 - section 12)

- Remove the rear cover (see § 1), the keypad and screen cover (see § 2)
- Unplug connectors J2, J3, J5, J8 and J9 located on the main P.C. board
- Unplug the flat cable connected to the power supply (cable J7 on the main P.C. board)
- Unscrew the 2 screws (G17)
- Slide the main P.C. board slowly to the right to unplug it from the migration compartment
- Remove the main P.C. board

#### 8.6 MAIN POWER SUPPLY (figure 3 - section 12)

- Remove the rear cover (see § 1)
- Unplug all connectors located on the front of the main power supply, and the connector located at the bottom right corner of the main power supply

- Unscrew and remove the screw used to fix the earth wire (green/yellow) of the main power supply on the chassis
- Unscrew and remove the 5 screws (G18)
- Remove the main power supply (G10)

#### 8.7 PUMP ASSEMBLY AND PINCH VALVE (figure 9 - section 12)

- Unplug all the valve tubing
- Remove the rear cover (see § 1)
- Unscrew and remove the 2 screws (B7)
- Remove the pump cover (B1)
- Unplug the pump connector (J5) located on the main P.C. board
- Unscrew and remove the 2 screws (B6)
- Unplug both pump tubings
- Remove the pump assembly (G12)
- Remove the tubing from the pinch valve
- Unscrew and remove the screw used to fix the earth wire of the pinch valve at the bottom of the chassis
- Unplug the connector J2 located on the valve P.C. board
- Unscrew the 2 screws used to fix the pump holder (B2) on the chassis
- Unscrew and remove the 2 screws (B5)
- Remove the pinch valve (B4).

#### 8.8 VALVE ASSEMBLY (figures 3 and 9 - section 12)

- Remove the rear cover (see § 1)
- Unplug all the valve tubings
- Unscrew and remove the 4 screws (V15)
- Remove the valve metal plate (V14)

- Unplug connector J2 located on valve motor P.C. board and the connector J2 located on the staining dryer P.C. board
- Unscrew and remove the 4 screws (G21)
- Remove the mechanical part of the valve.

#### 8.9 VALVE MOTOR AND VALVE P.C. BOARD (figure 10 - section 12)

- Remove the rear cover (see §1)
- Remove the valve assembly (see §8)
- Unscrew and remove the 2 screws (V6)
- Untight the 2 screws (V21)
- Unscrew and remove the 2 screws (V8)
- Slide the motor to the right and remove it with the P.C. board
- Unsolder the 4 wires of the motor from the valve P.C. board (P1, P2, P3 and P4), then the motor and the valve P.C. board are free
- The screws (V21) must be well tightened on the motor shaft flat to prevent any play between the motor and the valve cam.

#### 8.10 STAINING/DESTAINING/HEATER ASSEMBLY (see figures 3, 9 and 12 - section 12)

- Remove the rear cover (see §1), the keypad and screen cover (see §2)
- Unplug all valve tubings
- Unscrew and remove the 2 screws (B7)
- Remove pump cover (B1)
- Unplug the pump tubing connected to the tank bottom fitting
- Unplug the top valve tubing connected to the tank top fitting
- Unplug the flat connector J8 located on the main P.C. board
- Unplug the connector J2 located on the staining dryer P.C. board

- Untight the 2 screws of J6 and unplug the 2 wires (black wire connected to position 1, white wire connected to position 3 of J6)
- Unscrew and remove the screw (C24) used to fix the earth wire (C22) (green/ yellow) and the bottom left screw (C25) used to fix the other earth wire
- Unscrew and remove the 4 screws (G19)
- Remove the staining/destaining/dryer assembly

#### 8.11 HEATING ELEMENTS (see figure 12 - section 12)

- Remove the rear cover (see §1), the keypad and screen cover (see §2)
- Untight the 2 screws (position 1 and 3) of J7 (located on the staining dryer P.C. board) and unplug the 2 wires
- Unscrew and remove the 2 screws (C12)
- Pull up the heating elements (C13) with the protection cover (C14)

Note : The assembly consists of 1 resistor and 1 thermal switch.

#### 8.12 DRYER FAN (see figure 12 - section 12)

- Remove the staining/destaining/dryer assembly (see §10)
- Unplug the fan connector J3 located on the staining dryer P.C. board
- Unscrew and remove the 4 screws (C8) then the fan (C7) is free.

#### 8.13 GEL HOLDER ELECTROMAGNET (see figure 12 - section 12)

- Remove the rear cover (see §1), the keypad and screen cover (see §2)
- Unplug the electromagnet connector J5 located on the staining dryer P.C. board
- Unscrew with pliers the electromagnet (C2) from the tank and remove it.

#### 8.14 STAINING/DESTAINING TANK (see figure 12 - section 12)

- Remove the staining/destaining/dryer assembly (see §10)

- Unplug the level probe connector J4 and the electromagnet connector J5 located on the staining dryer P.C. board
- Unscrew and remove the screw used to fix the temperature transducer (C11)
- Unscrew and remove the 4 screws (C25), then the tank is free.

#### 8.15 TANK LEVEL PROBE (see figure 12 - section 12)

- Remove the staining/destaining tank (see §10 and §14)
- Insert a blade flat screw driver between the tank and the level probe (C3) edge to disengage it
- The leakproofness is made by the level probe "O" ring.

#### 8.16 RADIATOR FAN (see figure 4 - section 12)

- Remove the rear cover (see §1)
- Unscrew and remove the 4 screws (M13)
- Remove the fan protection grid (M12)
- Unscrew and remove the 4 screws (M14)
- Unplug the fan connector J2 located on the cam motor P.C. board
- Remove the radiator fan (M11).

#### 8.17 MIGRATION MODULE (see figure 3 - section 12)

- Remove the rear cover (see §1), the keypad and screen cover (see §2)
- Unplug the high voltage connector located on the main power supply
- Unscrew and remove the 6 screws (G19)
- Slide the migration module to the left to disengage it from the main P.C. board (G11)
- Lift the migration module (G4) up to remove it.

#### 8.18 MIGRATION COVER ELECTROMAGNET (see figure 5 - section 12)

- Remove the rear cover (see §1), the keypad and screen cover (see §2)
- Unscrew and remove the 2 screws (M8)
- Unsolder the 2 wires and remove the electromagnet (M2) with its holder

#### 8.19 CAM MOTOR AND CAM MOTOR P.C. BOARD (see figures 4 and 5- section 12)

- Remove the rear cover (see §1)
- Unscrew and remove the 4 screws (M13)
- Remove the fan protection grid (M12)
- Unscrew and remove the 4 fan screws (M14) to slide it to the back
- Unplug the connectors J1, J2 and J3 located on the cam motor P.C. board.
- Open the migration cover (M1)
- Unscrew and remove the 4 screws (M9)
- Remove the cam motor with the P.C. board
- Unsolder the 4 wires of the motor from the P.C. board (P1, P2, P3 and P4)
- Unscrew the cam screw
- Remove the cam
- Unscrew and remove the 2 screws (M15), then the motor and the cam P.C. board are free.
- The cam screw must be well tightened on the motor shaft flat to prevent any play between the motor and the cam.

#### 8.20 PELTIER MODULES (see figure 5 - section 12)

- Remove the migration module (see § 17) and put it upside down
- Unscrew and remove the 8 screws (M16)
- Remove the radiator (M10a) (be careful, the temperature transducer T2 is fixed on it)
- Remove the radiator (M10b)
- Then you have access to the 2 Peltier modules (M5).

Note : The Peltier modules are connected in series (be careful of their polarity).

#### WARNINGS TO REASSEMBLE THE PELTIER MODULES (M5) :

- Apply a regular layer of thermal grease (silicon compound) on both sides
- Center the 2 Peltier modules with the migration plate (respect the position given by the black and red wires)
- Install the 2 radiators (M10a and M10b)
- Insert the 8 radiator screws (M16) with the washers and tight them slowly, **alternating the screws with a torque screw driver set to 56 cNm (centi Newton meter)**
- Check that the both Peltier modules remain centered on the migration plate and note that thermal grease escapes around module edges
- Tighten the 8 screws until the limit given by the torque screwdriver.

#### 8.21 MIGRATION FAN (see figure 5 - section 12)

- Remove the migration module (see § 17) and put it upside down
- Unplug the fan connector J7 located on the cam motor P.C. board
- Remove the radiator (M10a) (see § 20)
- Unscrew the 2 screws (M17)
- Remove the migration fan (M7) with its holder

#### 8.22 THERMAL SWITCH AND TEMPERATURE PROBES T1 AND T2 (see figure 5 - section 12)

- Remove the migration module (see § 17) and put it upside down
- Remove the 2 radiators (M10a) and (M10b) (see §20)
- Unsolder the 2 wires from the thermal switch (M22)
- Unscrew and remove the screws of the thermal switch, then it is free
- Unsolder the 2 wires from the temperature probe T1
- Unscrew and remove the screw of the probe, then it is free



- For transducer T2 which is fixed on radiator (M10a), the procedure is the same.

### WARNINGS :

- The hole where is inserted the temperature probe must be full of thermal grease (silicon compound).
- Use epoxy glue on the temperature probe P.C. board to prevent any short circuit with water condensation between the legs of the transducer.

### 8.23 MIGRATION HEATING ASSEMBLY (see figure 5 - section 12)

- Remove the migration module (see § 17)
- Insert slightly a small blade between one of the corners of the adhesive migration film (M25) and the migration surface to unstick and remove it completely
- Put the migration module upside down
- Remove the Peltier modules (see § 20)
- Unscrew and remove the 8 screws (M18)
- Remove fixation parts (M19 and M20)
- Remove the temperature probe T1 (see §22)
- Unscrew and remove the 2 screws (M24) used to fix the 2 earth wires (green and yellow)
- Unsolder the 2 wires of the heating element (blue and Grey) from the connector of the migration module, then the migration heating assembly is free.

## **SECTION 9 : MAINTENANCE**

## SECTION 9 : MAINTENANCE

### 9.1 DAILY :

After each migration gently wipe the electrodes lengthwise and the migration plate with a wet tissue paper.

### 9.2 WEEKLY :

1/ To avoid accumulation of salt on the electrodes, soak the migration carrier horizontally overnight in a bath filled to 5 mm height of distilled water. Wipe with a dry tissue before putting it back in place.

2/ To clean the staining tank, proceed as follows :

- reconstitute the washing solution as indicated in the instruction leaflet of the kit : HYDRASYS WASH SOLUTION ref. 4541.
- be sure that there is enough destaining solution (300 ml)
- from the main menu, press  to have access to the staining program menu
- select TANK CLEANING program
- press START key (green arrow on the right of the keypad)

The cleaning program consists of 3 steps :

- one bath of washing solution connected to the line 6 of the valve (washing solution 1). It lasts 5 min. with intermittent circulation of the solution. When the cycle is finished, the solution goes to the waste.
- one bath of destaining solution connected to line 5 of the valve. It lasts 1 min. and 40 sec. with intermittent circulation of the solution. When the cycle is finished, the solution goes to the waste.
- one drying step which lasts 8 min. After drying, the instrument emits a "beep" indicating that the cleaning program is finished and the gel holder is unlocked.

### 9.3 YEARLY :

Replace the pinch-valve and valve tubings, lubricate the 4 "O" rings of the applicator/electrode carrier and check its adjustment (refer to section 7).

**Maintenance kit** : p/n 10043545

## **SECTION 10 : MESSAGES, INCIDENTS AND ERRORS**


## SECTION 10 : MESSAGES, INCIDENTS AND ERRORS

### 10.1 MESSAGES :

The messages that can appear on the screen are listed below. They ask either to stand by (for example : "Plate cooling") or to act (for example : "Waste tank full").






TITLE	CORRECTIVE ACTION
PLATE HEATING	Wait for rise in temperature of migration plate. If too long, check relays K1 and K2, IC28, 30V power supply, Peltier modules and heating element
PLATE COOLING	Wait for cooling of migration plate. If too long, check relays K1 and K2, IC28, 30V power supply and Peltier modules
ILLEGAL SELECTION	Wrong selection
IN OPERATION	Message appears if a program is chosen while one is already running
WASTE TANK FULL	Empty the waste container
CLOSE DOOR	Message appears if the migration program is started with the door opened. Close the door then start the migration procedure again.
OPEN / CLOSE DOOR	Open or close the door of the migration compartment
NO GEL HOLDER	If the staining program is started without first introducing the gel holder, this message will appear on the screen. Introduce the gel holder then start the staining procedure again

## 10.2 INCIDENTS

These incidents stop the activity of a module without interrupting the activity of the other one. The incident appears in the part of the screen corresponding to the module affected. The module will then be put in the pause mode. Pressing the corresponding green start  key restarts the interrupted cycle.

TITLE	EXPLANATION	CORRECTIVE ACTION
MIGR. MODE ERROR	Migration module program error	<ul style="list-style-type: none"> <li>- Software problem</li> <li>- Main P.C. board faulty</li> </ul>
STAIN. MODE ERROR	Staining module program error	<ul style="list-style-type: none"> <li>- Software problem</li> <li>- Main P.C. board faulty</li> </ul>
APPLICATOR ERROR	Position of the applicator/electrode carrier cam not reached in the programmed time	<ul style="list-style-type: none"> <li>- Cam screw not tightened on the motor shaft</li> <li>- Position opto (MA1 or MA2) faulty</li> <li>- Motor/gear box faulty</li> <li>- Motor driver (IC38) faulty</li> <li>- Main P.C. board faulty</li> </ul>
P.S. ERROR	Migration power supply serial link error	<ul style="list-style-type: none"> <li>- Serial link connector unplug on the main power supply</li> <li>- ACIA (IC22) or circuit (IC23) faulty</li> <li>- Main power supply faulty</li> <li>- Main P.C. board faulty</li> </ul>
MIGRAT. DRYER ERROR	Migration plate temperature not reached in the programmed time during the drying cycle	<ul style="list-style-type: none"> <li>- Power supply (30V) faulty</li> <li>- Temperature probe T1 faulty</li> <li>- Thermal switch located beside the temperature probe T1 faulty</li> <li>- Heating element broken</li> <li>- Relay K1 or K2 faulty</li> <li>- IC28 faulty</li> <li>- Main P.C. board faulty</li> </ul>
VALVE ERROR	Valve position not reached in the programmed time	<ul style="list-style-type: none"> <li>- Valve coupling screws loose on the motor shaft flat</li> <li>- Valve origin position opto faulty</li> <li>- Motor/gear box faulty</li> <li>- Motor driver (IC41) faulty</li> <li>- Gate array Automate 2 (IC21) faulty</li> <li>- Main P.C. board faulty</li> </ul>



TITLE	EXPLANATION	CORRECTIVE ACTION
FILLING ERROR	Chamber not filled in the programmed time or high level detected before low level	<ul style="list-style-type: none"> <li>- Press start  key to run a new cycle</li> <li>- Jam</li> <li>- Reagent container empty</li> <li>- Reagent tubing pinched</li> <li>- Pinch valve and valve tubings pinched</li> <li>- Valve metal plate screws not tight</li> <li>- Pump faulty</li> <li>- Valve faulty</li> <li>- Pinch valve faulty</li> <li>- Pump motor driver (IC31) faulty</li> <li>- Pinch valve driver (IC28) faulty</li> <li>- Level probes faulty</li> <li>- Main P.C. board faulty</li> </ul>
DRAINING ERROR	Chamber not drained in the programmed time	<ul style="list-style-type: none"> <li>- Press start  key to run a new cycle</li> <li>- Jam</li> <li>- Stain tubing or waste tubing pinched</li> <li>- Pinch valve and valve tubings pinched</li> <li>- Valve faulty</li> <li>- Pinch valve faulty</li> <li>- Pump faulty</li> <li>- Pump motor driver (IC31) faulty</li> <li>- Pinch valve driver (IC28) faulty</li> <li>- Level probes faulty</li> <li>- Make a Reset History (see § 5.3.1)</li> <li>- Main P.C. board faulty</li> </ul>
STAIN. DRYER ERROR	Temperature not reached in the programmed time	<ul style="list-style-type: none"> <li>- Press start  key to run 1 or 2 cycles. If incident remains, select RESET HISTORY (see section 7) from MEMORY and TESTS menus. Press  CONT.  to reset the temperature regulation parameters and execute a new staining cycle</li> <li>- Temperature probe T3 faulty</li> <li>- Check fuse F3 on staining dryer P.C. board</li> <li>- Heating element/thermal switch faulty</li> <li>- Triac (Q2) or opto-isolator (MA2) located on the staining dryer P.C. board faulty</li> <li>- Staining dryer P.C. board faulty</li> <li>- Main P.C. board faulty</li> </ul>

### 10.3 ERRORS

These errors completely interrupt all functions of HYDRASYS LC. An identification number is displayed on the screen. Upon validation, the instrument is reinitialized.

ERROR	EXPLANATION	CORRECTIVE ACTION
<b>LEVEL DETECTOR</b>		
40	Low level detection problem in the staining chamber	<ul style="list-style-type: none"><li>- Select COMMANDS from TESTS menu : on the screen next to LL, it must be indicated <math>70 \pm 10</math> when the chamber is empty, <math>150 \pm 20</math> when the chamber is full</li><li>- Low level probe faulty</li><li>- A/D converter (IC8) faulty</li><li>- Amp (IC34), current mirror (Q6), diode (D36) or transistor (Q5) faulty</li><li>- Main P.C. board faulty</li></ul>
41	Mid level detection problem in the staining chamber	<ul style="list-style-type: none"><li>- Select COMMANDS from TESTS menu : on the screen next to ML, it must be indicated <math>70 \pm 10</math> when the chamber is empty, <math>150 \pm 20</math> when the chamber is full</li><li>- Middle level probe faulty</li><li>- A/D converter (IC8) faulty</li><li>- Amp (IC34), current mirror (Q10), diode (D38) or transistor (Q9) faulty</li><li>- Main P.C. board faulty</li></ul>
42	High level detection problem in the staining chamber	<ul style="list-style-type: none"><li>- Select COMMANDS from TESTS menu : on the screen next to HL, it must be indicated <math>70 \pm 10</math> when the chamber is empty, <math>150 \pm 20</math> when the chamber is full</li><li>- High level probe faulty</li><li>- A/D converter (IC8) faulty</li><li>- Amp (IC35), current mirror (Q8), diode (D37) or transistor (Q7) faulty</li><li>- Main P.C. board faulty</li></ul>

ERROR	EXPLANATION	CORRECTIVE ACTION
<b>THERMAL REGULATION</b>		
50	Regulation problem with the migration plate temperature probe T1 (top side of the Peltier modules)	<ul style="list-style-type: none"> <li>- Select COMMANDS from TESTS menu : on the screen next to T1 is indicated the migration plate temperature. The measured value is not within the defined limits (5°C to 95°C)</li> <li>- Temperature probe T1 faulty</li> <li>- Amp (IC9) or A/D converter (IC8) faulty</li> <li>- Main P.C. board faulty</li> </ul>
51	Regulation problem with the radiator temperature probe T2 (bottom side of the Peltier modules)	<ul style="list-style-type: none"> <li>- Select COMMANDS from TESTS menu : on the screen next to T2 is indicated the radiator temperature of the Peltier modules. The measured value is not within the defined limits (5°C to 95°C)</li> <li>- Temperature probe T2 faulty</li> <li>- Amp (IC9) or A/D converter (IC8) faulty</li> <li>- Main P.C. board faulty</li> </ul>
52	Regulation problem with the staining dryer module temperature probe T3	<ul style="list-style-type: none"> <li>- Select COMMANDS from TESTS menu : on the screen, next to T3 is indicated the dryer temperature. The measured value is not within the defined limits (5°C to 95°C).</li> <li>- Temperature probe T3 faulty</li> <li>- Amp (IC9) or A/D converter (IC8) faulty</li> <li>- Staining dryer P.C. board faulty</li> <li>- Main P.C. board faulty</li> </ul>
<b>MOTOR CURRENT DETECTION</b>		
60	Gear pump motor current consumption too high during filling of the tank with the first model of pump (SEIM® model)	<ul style="list-style-type: none"> <li>- Pump jammed : dismantle the pump body to clean the 2 gears</li> <li>- Reagent tubings pinched</li> <li>- Pinch valve and valve tubings pinched</li> <li>- Pump faulty</li> <li>- Pinch valve or valve faulty</li> <li>- Incorrect pump current calibration (see section 5.1.4)</li> <li>- Pump motor driver (IC31) faulty</li> <li>- Pinch valve driver (IC28) faulty</li> <li>- Main P.C. board faulty</li> </ul>

ERROR	EXPLANATION	CORRECTIVE ACTION
61	Gear pump motor current consumption too high during draining of the tank with the first model of pump (SEIM® model)	<ul style="list-style-type: none"> <li>- Pump jammed : dismantle the pump body to clean the 2 gears</li> <li>- Reagents and waste tubings pinched</li> <li>- Pinch valve and valve tubings pinched</li> <li>- Pump faulty</li> <li>- Pinch valve or valve faulty</li> <li>- Incorrect pump current calibration (see section 5.1.4)</li> <li>- Pump motor driver (IC31) faulty</li> <li>- Pinch valve driver (IC28) faulty</li> <li>- Main P.C. board faulty</li> </ul>
<b>FAN REVOLUTION DETECTION</b>		
65	Migration chamber fan problem (fan too slow or no revolution pulses received)	<ul style="list-style-type: none"> <li>- Fan stopped : jam or mechanical problem</li> <li>- Fan faulty</li> <li>- Fan connector unplugged</li> <li>- Power supply (24V) faulty</li> <li>- Motor driver (IC 33) faulty</li> <li>- Fan controller (IC42) faulty</li> <li>- Gate array automate 1 (IC20) or gate array automate 2 (IC21) faulty</li> <li>- Main P.C. board faulty</li> </ul>
66	Radiator fan problem (fan too slow or no revolution pulses received)	<ul style="list-style-type: none"> <li>- Fan stopped : jam or mechanical problem</li> <li>- Fan faulty</li> <li>- Fan connector unplugged</li> <li>- Power supply (24V) faulty</li> <li>- Motor driver (IC 28) faulty</li> <li>- Fan controller (IC44) faulty</li> <li>- Gate array automate 1 (IC20) or gate array automate 2 (IC21) faulty</li> <li>- Main P.C. board faulty</li> </ul>
67	Staining module problem (no revolution pulses received)	<ul style="list-style-type: none"> <li>- Fan stopped : jam or mechanical problem</li> <li>- Fan faulty</li> <li>- Fan connector unplugged</li> <li>- Power supply (24V) faulty</li> <li>- Motor driver (IC 33) faulty</li> <li>- Fan controller (IC45) faulty</li> <li>- Gate array automate 1 (IC20) or gate array automate 2 (IC21) faulty</li> <li>- Main P.C. board faulty</li> </ul>

ERROR	EXPLANATION	CORRECTIVE ACTION
<b>MISCELLANEOUS</b>		
72	Interruption problem (FIRQ)	<ul style="list-style-type: none"> <li>- Switch off the instrument for 40 s and restart</li> <li>- Main P.C. board faulty</li> </ul>
99	Interruption problem (IRQ)	<ul style="list-style-type: none"> <li>- Switch off the instrument for 40 s and restart</li> <li>- Software problem</li> <li>- Main P.C. board faulty</li> </ul>

## **SECTION 11 : SPARE PARTS**

## SECTION 11 : SPARE PARTS

REFERENCE	DRAWING	DESIGNATION
1270		HUMIDITY CHAMBER
10037021		MASK POSITIONNING AXIS
10037022		2 IF MASK
10037023		4 IF MASK
10037024		2 BJ MASK
10037025		12 IF PENTA MASK
10037026		4 BJ MASK
10037027		CSF MASK
10037031		15 ENZYMES MASK
10037032		30 ENZYMES MASK
10037033		MASK R1
10037034		MASK R2
10037035		MASK R3
10037036		MASK R4
10037110	G6	STAINING GEL HOLDER
10037111		RIGHT AXIS FOR STAINING GEL HOLDER
10037112		LEFT AXIS FOR STAINING GEL HOLDER
10037120	G6	STAINING GEL HOLDER FOR HYDRAGEL 7
10037210		CONTAINER 5 L
10037220		CONTAINER 0.5 L (BLACK CAP)
10037221		CONTAINER 0.5 L (RED CAP)
10037250		CONTAINER 2 L
10037514	M23	MIGRATION TEMP. PROBE PC BOARD
10037563	C11	STAINING TEMP. PROBE PC BOARD
10037566	C3	LEVEL PROBE
10037567	C1	STAINING TANK
10037800		APPLICATOR/ELECTRODE CARRIER
10037810	P1	REAR ELECTRODE CARRIER ASSY

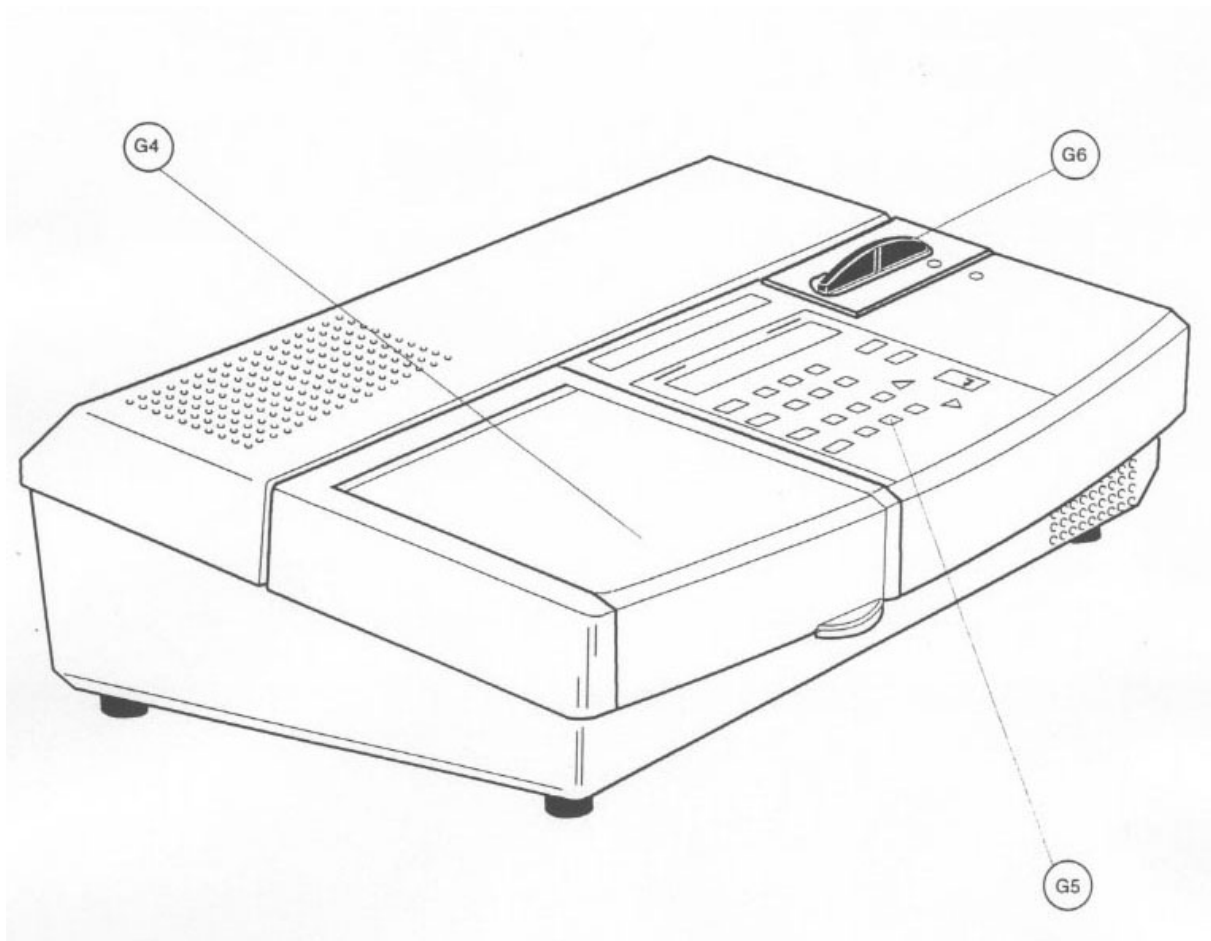
10037820	P2	FRONT ELECTRODE CARRIER ASSY
10043400	G10	POWER SUPPLY
10043511		CAM MOTOR P.C. BOARD
10043513	M4+M6+M21	MIGRATION HEATING ASSY
10043540		VALVE ASSY (6 LINES)
10043541	V5	VALVE MOTOR P.C. BOARD
10043543		VALVE ASSY (10 LINES)
10043545	V18	TUBING KIT FOR 6 AND 10-WAY VALVES
10043550A	G12	MAGNETIC DRIVE GEAR PUMP
10043562	C20	STAINING DRYER P.C. BOARD
10043700	G11	MAIN P.C. BOARD
21015019		RELAY 24V - 5A
31001724		MIGRATION COMPARTMENT PLASTIC BODY
31001725	M1	MIGRATION COMPARTMENT COVER
31001781	M25	MIGRATION PROTECTIVE FILM
31001783	P16/P19	SPONGE'S PIN
31001808		LEFT HANDLE OF THE STAINING GEL HOLDER
31001809		RIGHT HANDLE OF THE STAINING GEL HOLDER
31001817	G5	GEL POSITIONING GUIDE
31002078	G5	KEYPAD
31002086	V12	6-WAY VALVE INLET
31002087	V13	6-WAY VALVE COMMON POINT
40000326		CONTAINER TUBING 3 X 6 (1M)
40000356	M5	PELTIER ELEMENT
42589005	C13	HEATING ELEMENT 230V (STAINING)
42589006	C13	HEATING ELEMENT 115V (STAINING)
45360015	M2	MIGRATION COVER ELECTROMAGNET
45360016	C2	GEL HOLDER ELECTROMAGNET
45360024	B4	PINCH VALVE
45400031	A6	DISPLAY
45640013		OPTO SENSOR OPB 87L55
45750006		TRIAC TIC 253D
49600071		TEMPERATURE PROBE AD593CN
50000022	M26/V7	CAM/VALVE MOTOR + GEAR BOX
51000010	M11	RADIATOR FAN



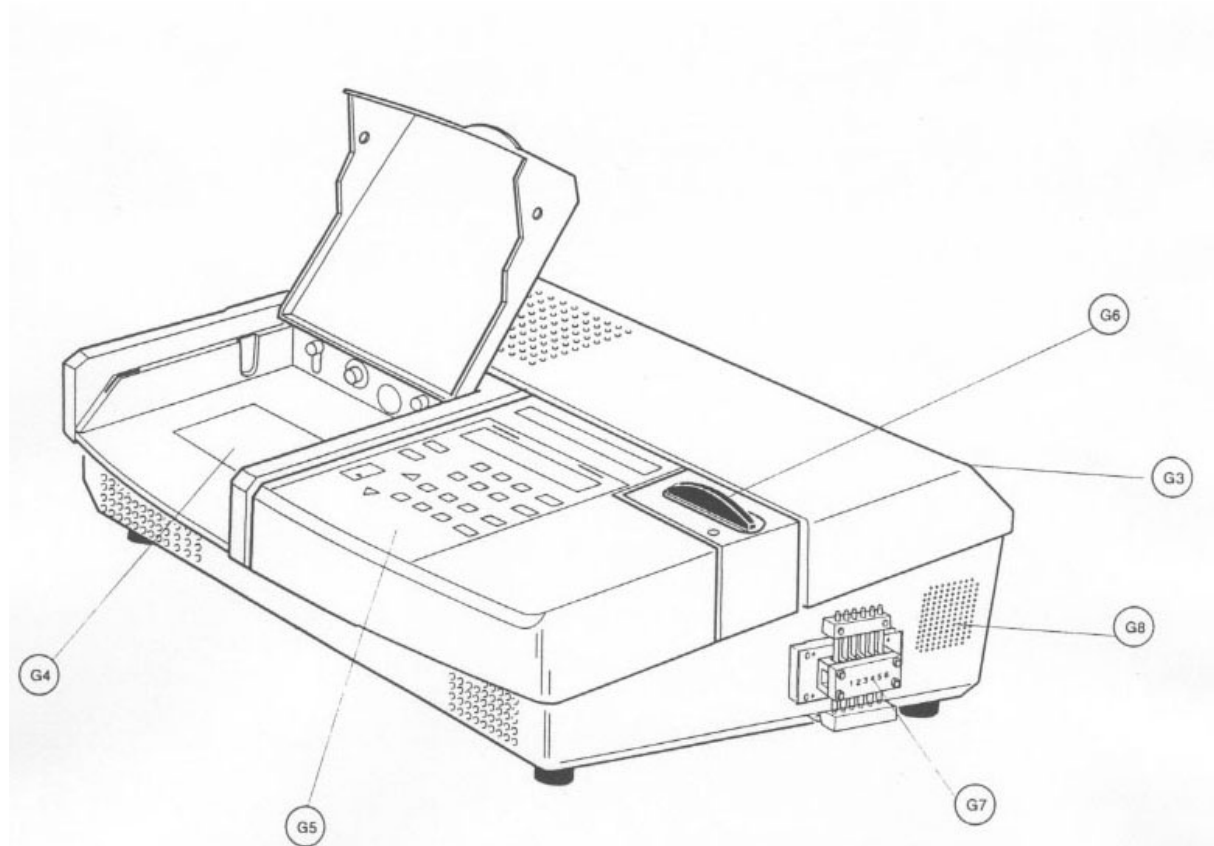
51000011	M7	MIGRATION FAN
51000012	C7	STAINING DRYER FAN

## **SECTION 12 : FIGURES**

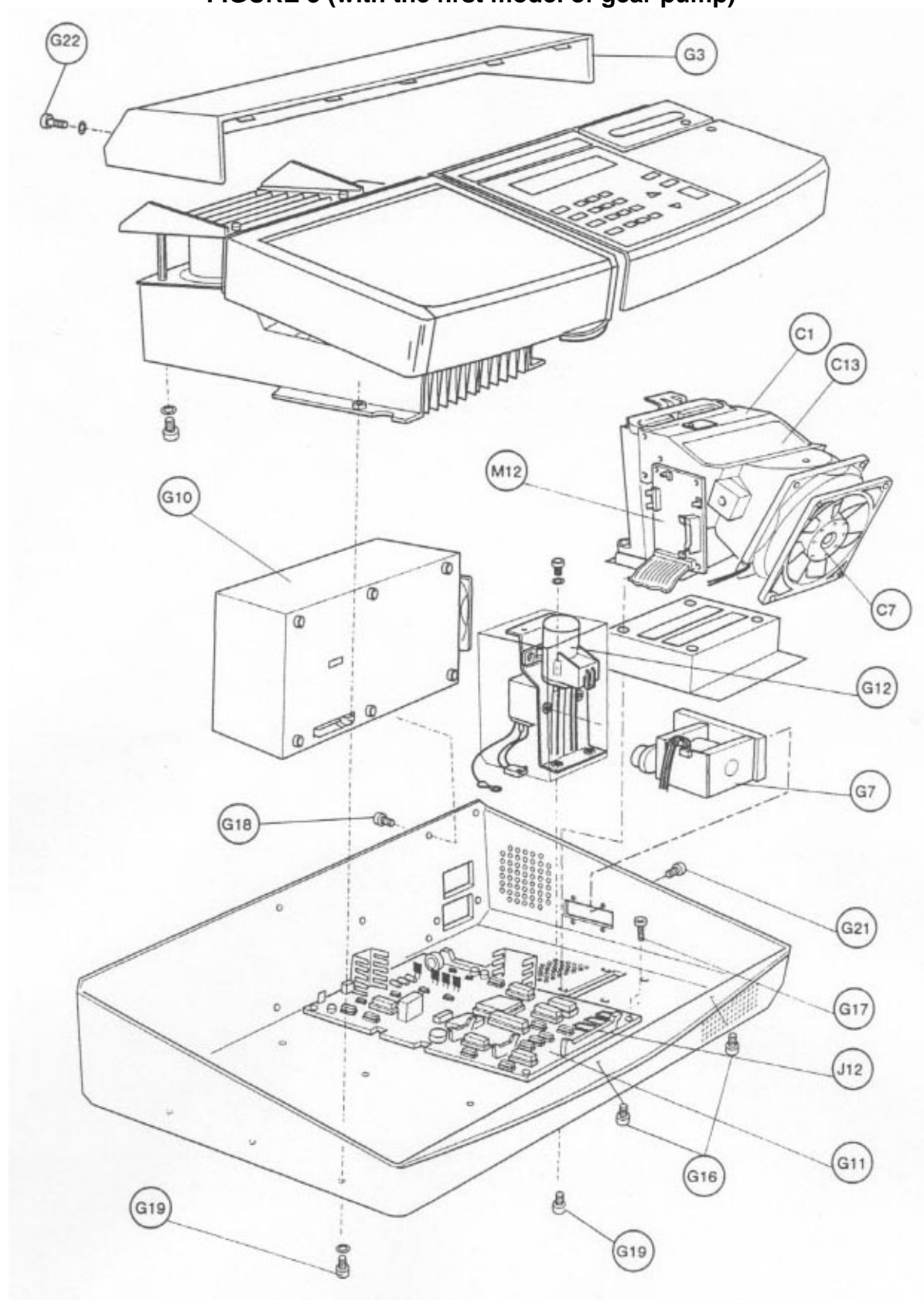
**FIGURE 1**



**FIGURE 2**



**FIGURE 3 (with the first model of gear pump)**



**FIGURE 3 (with the new magnetic drive gear  
pump)**

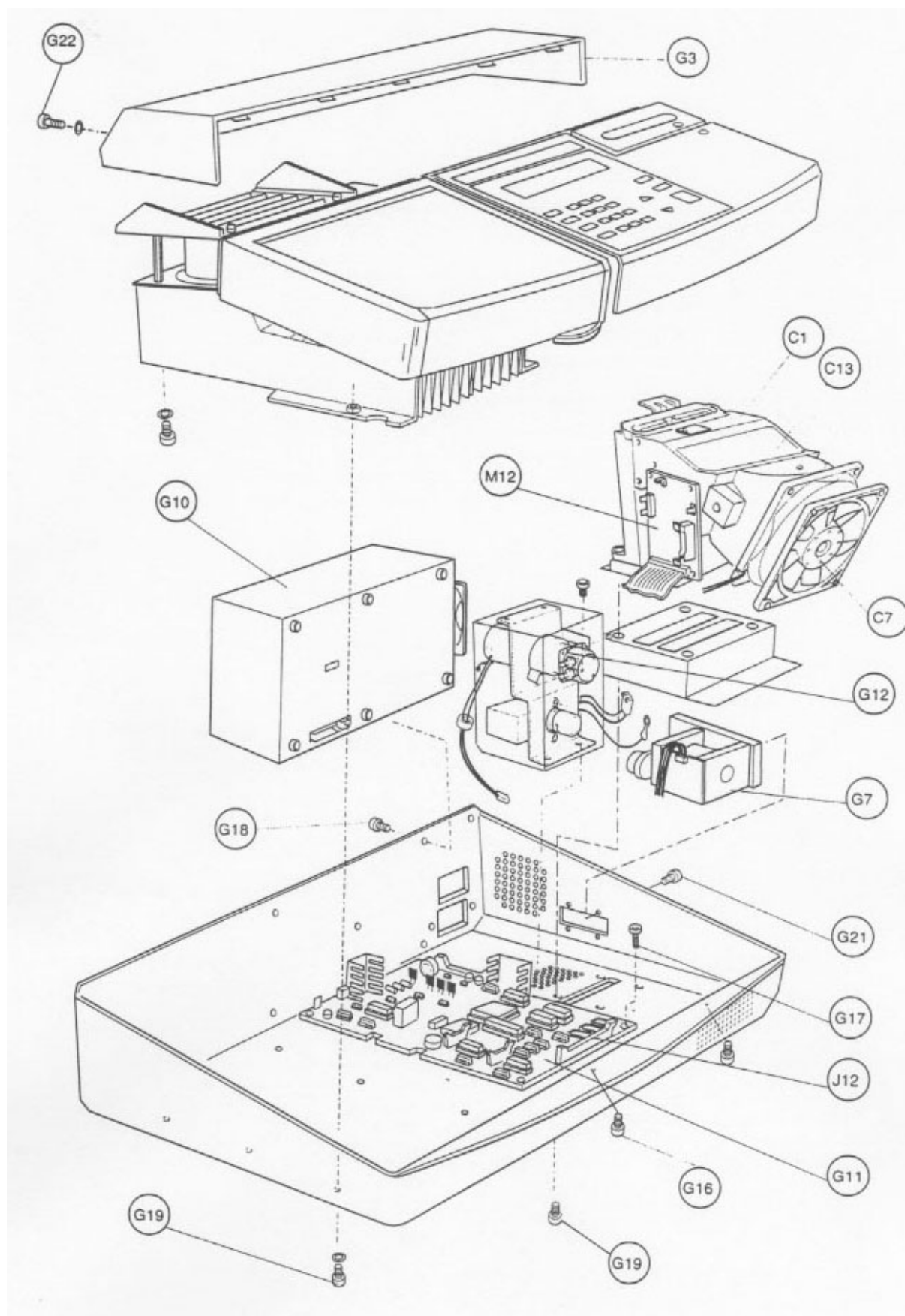


FIGURE 4

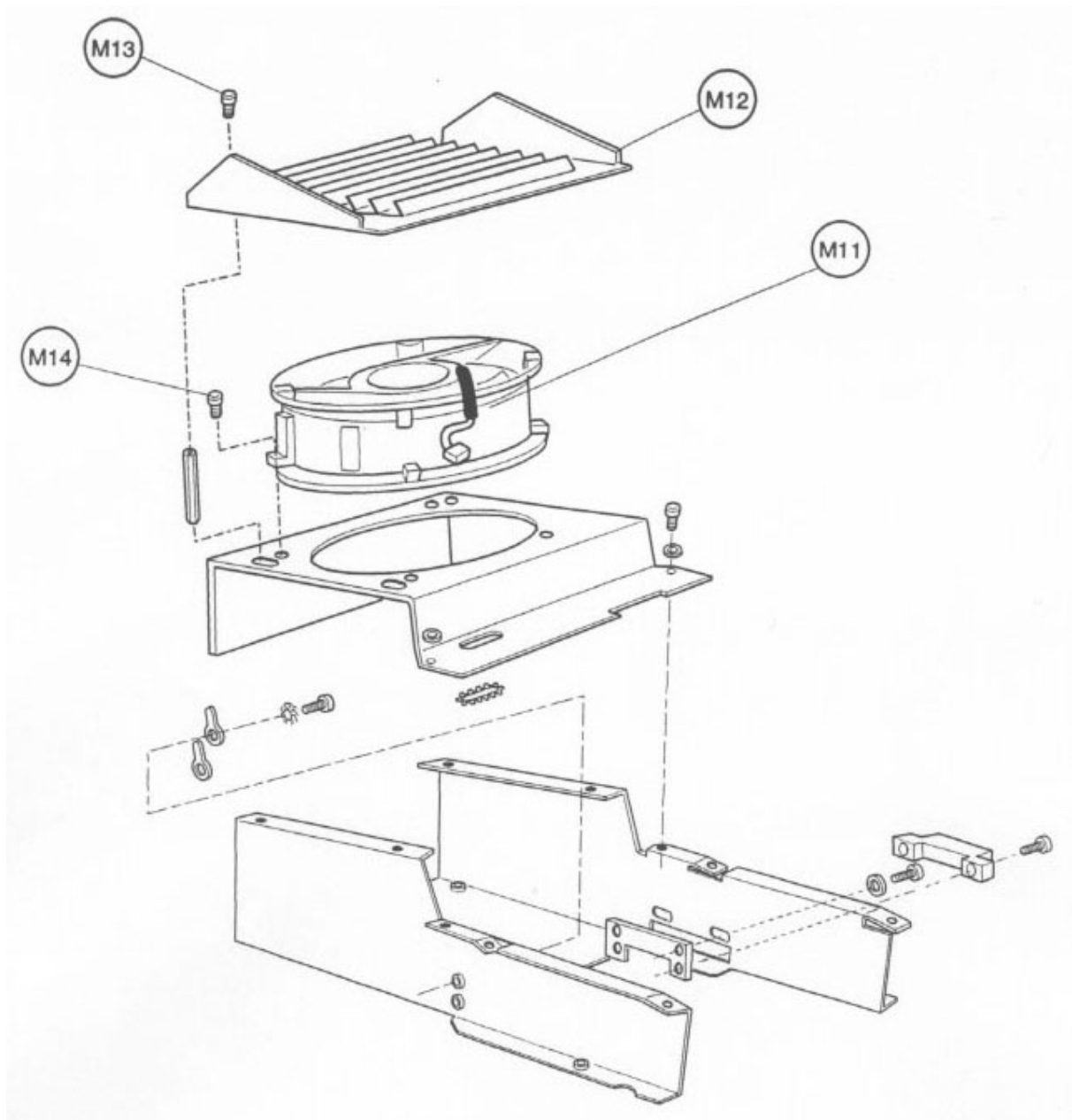
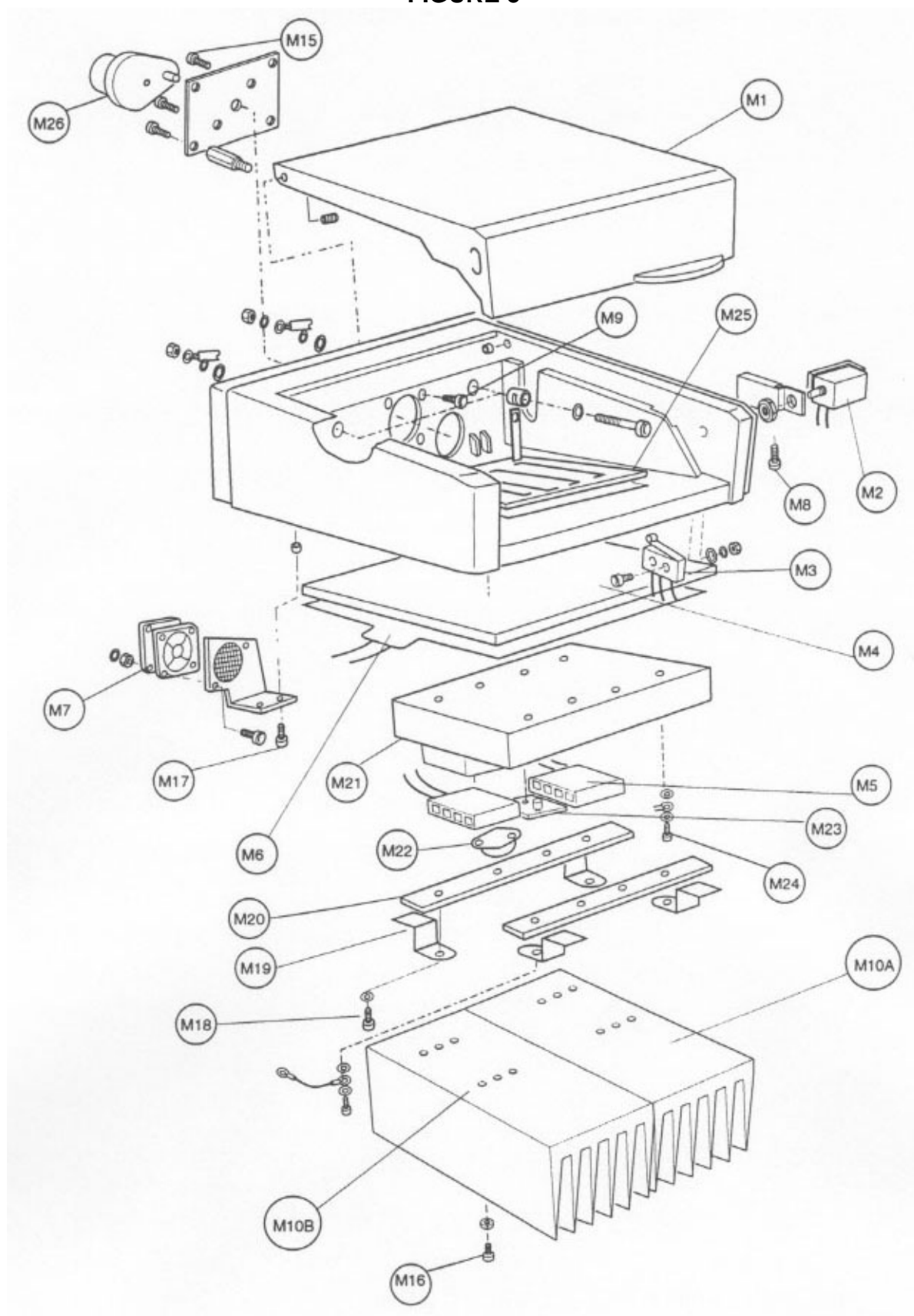
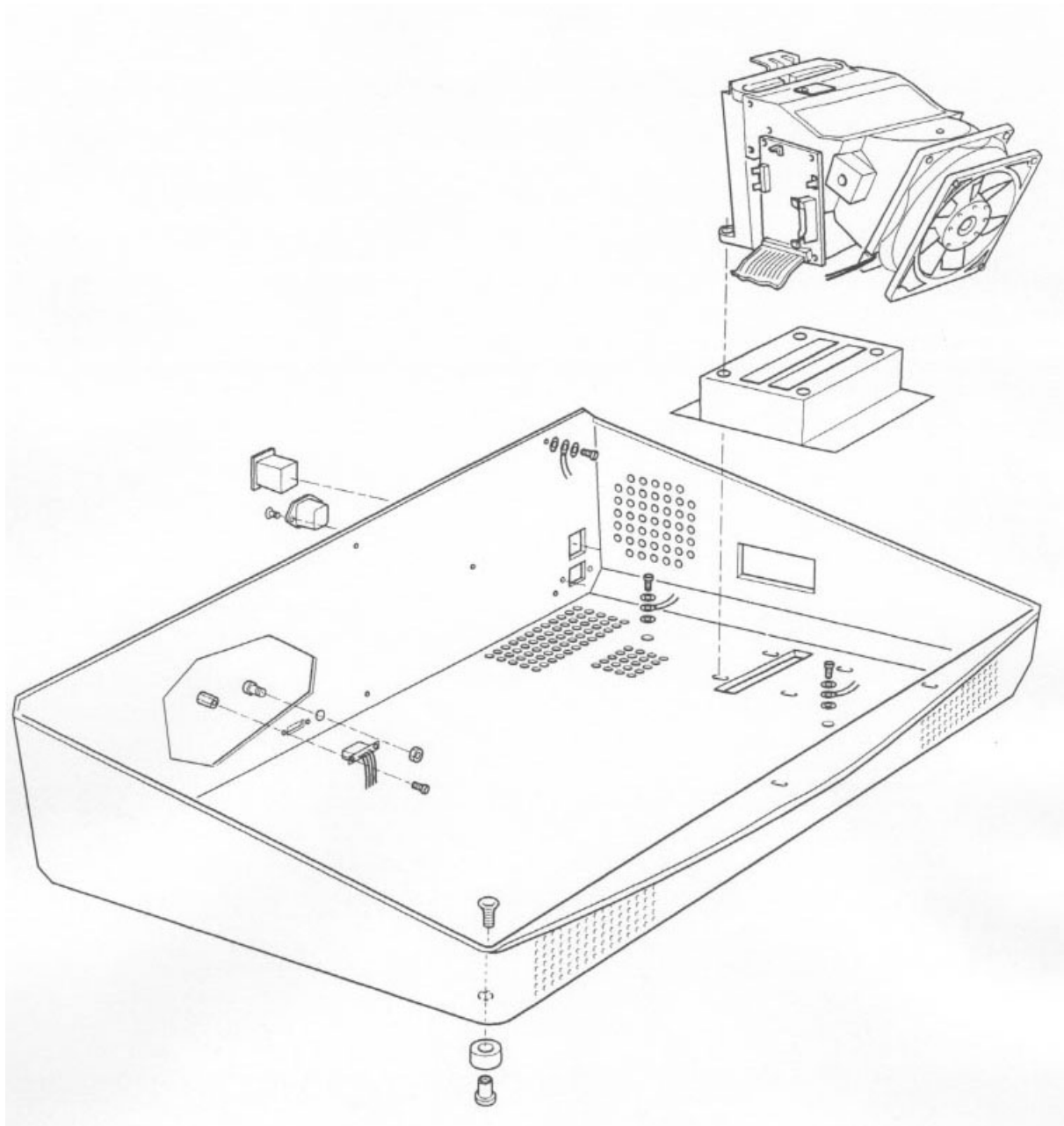




FIGURE 5



**FIGURE 6**



**FIGURE 7**

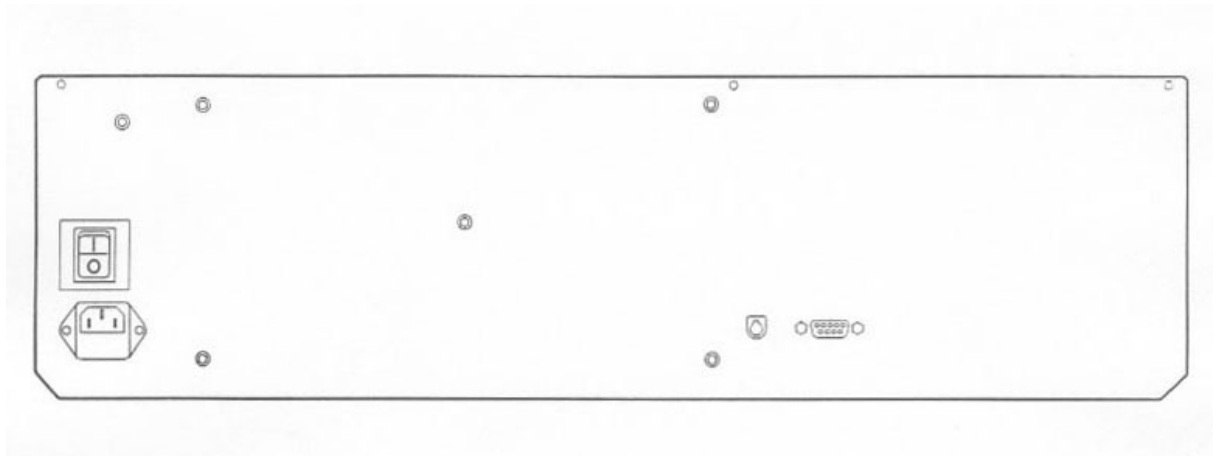
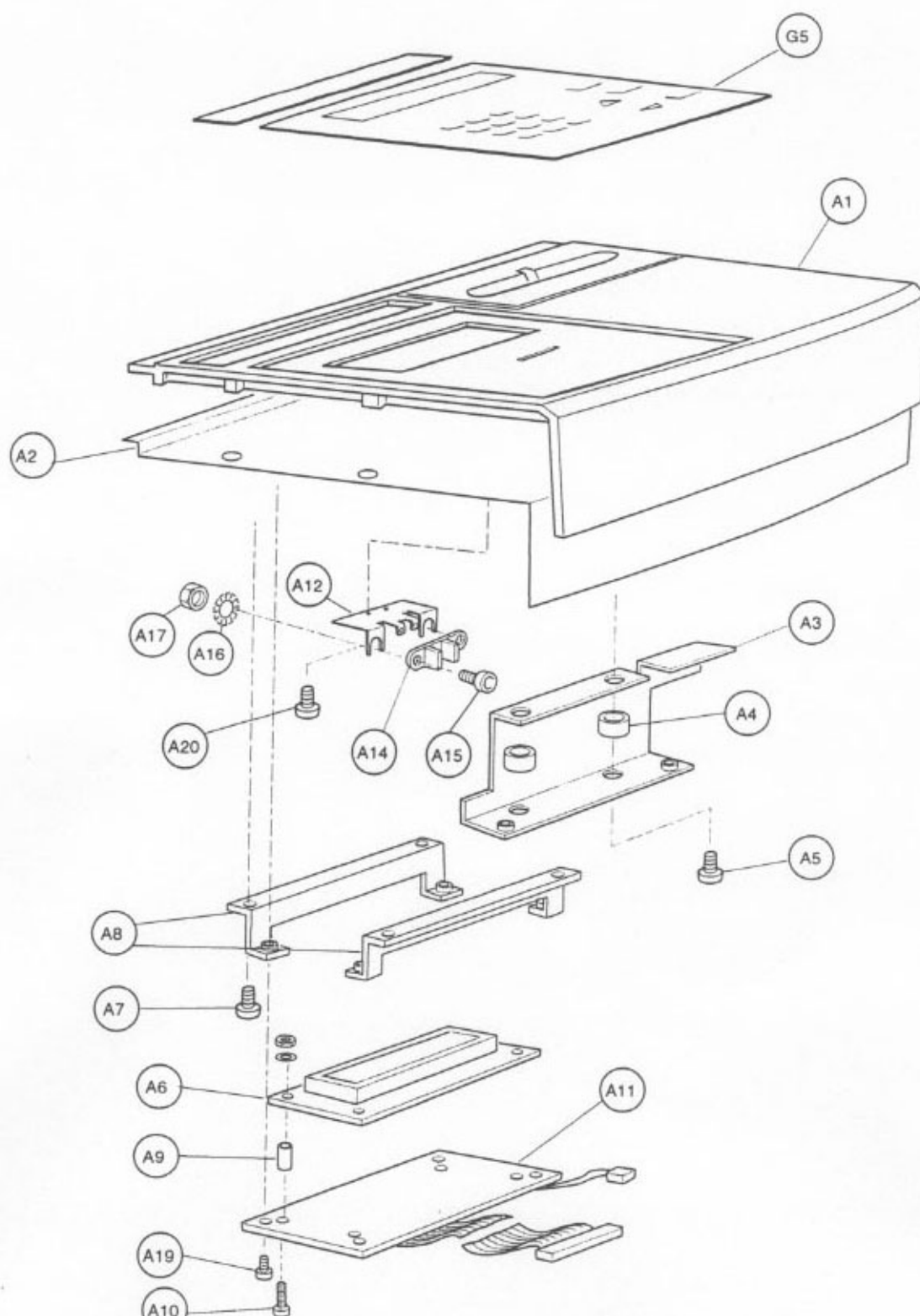
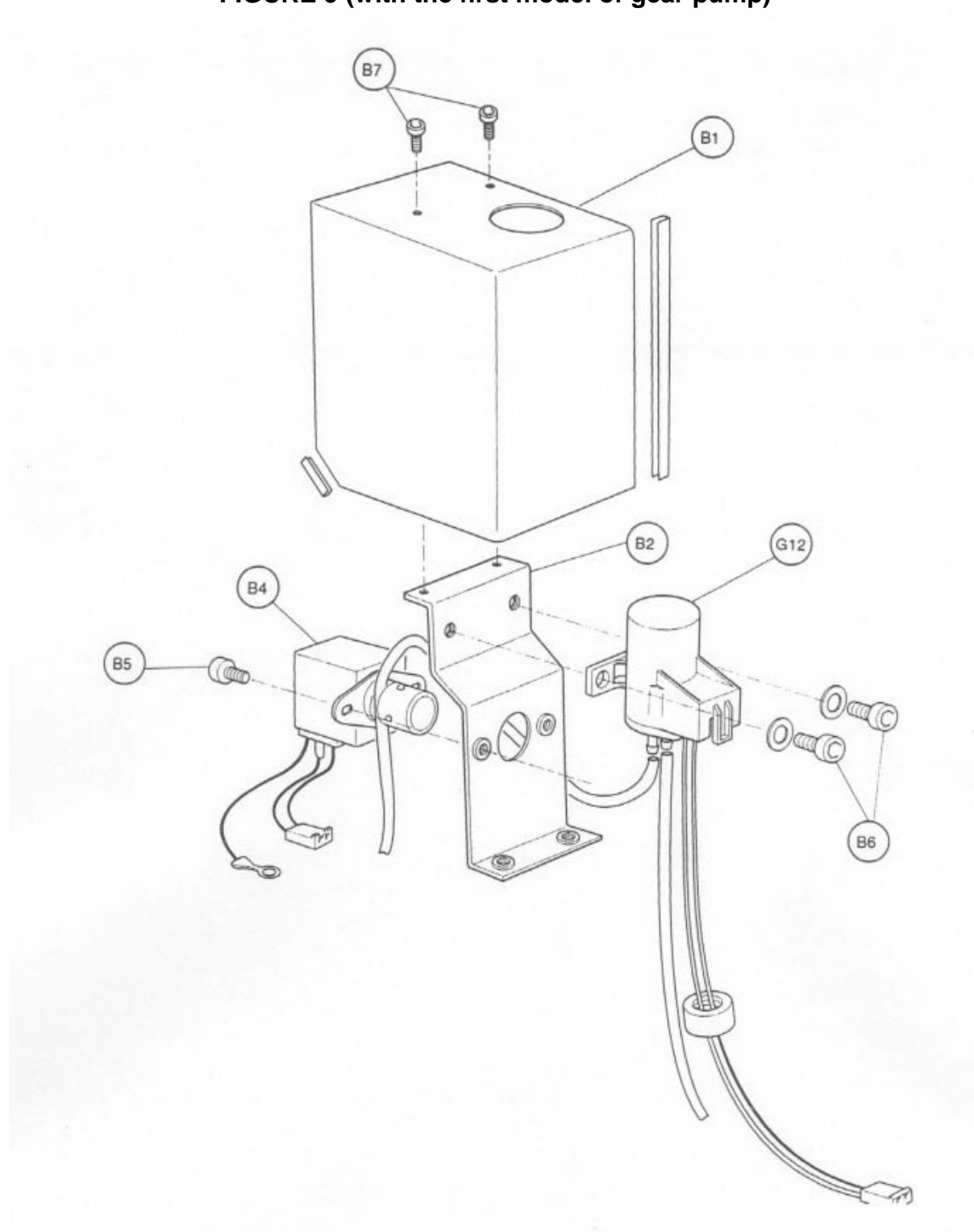


FIGURE 8



**FIGURE 9 (with the first model of gear pump)**



**FIGURE 9 (with the new magnetic drive gear pump)**

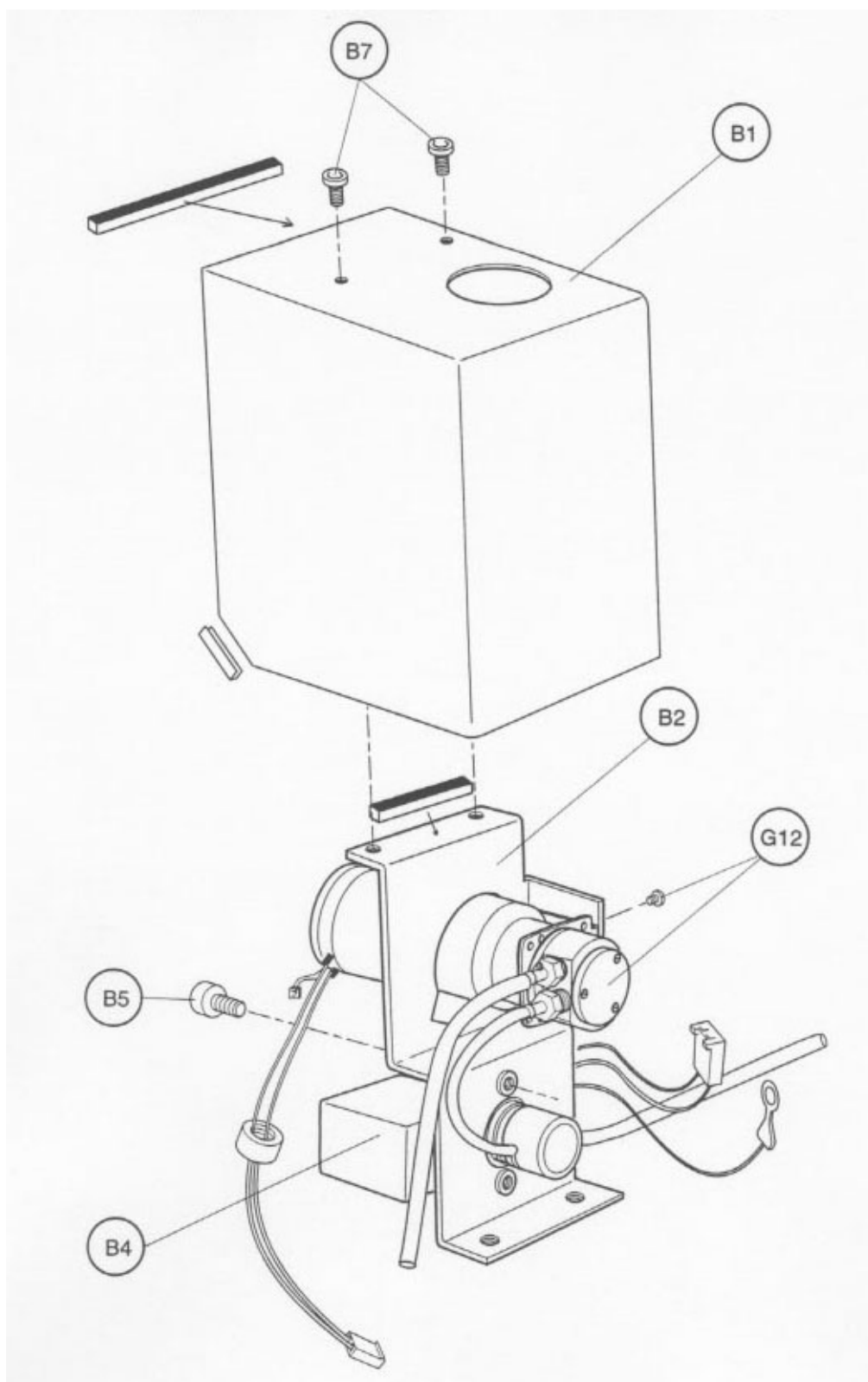
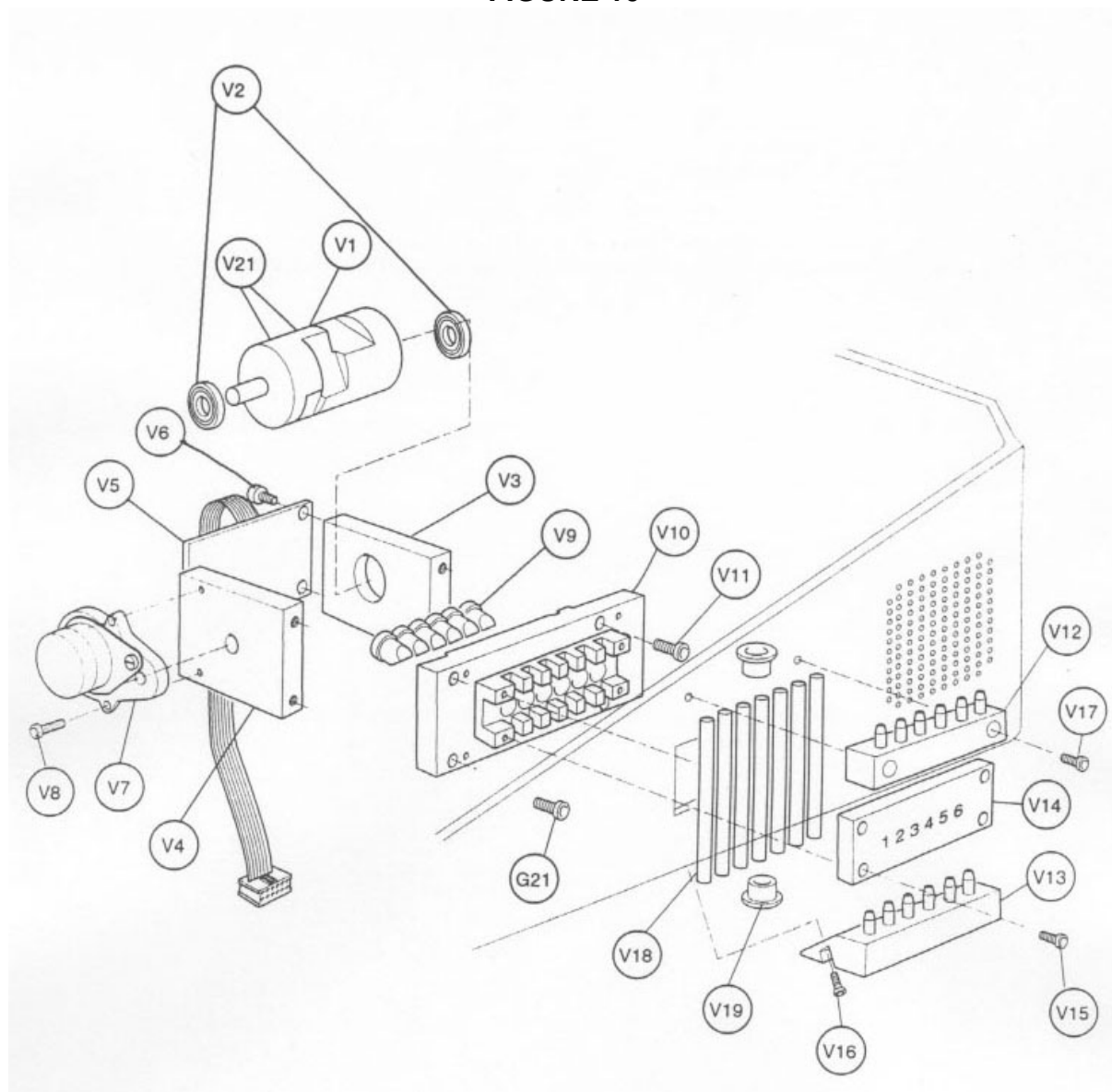
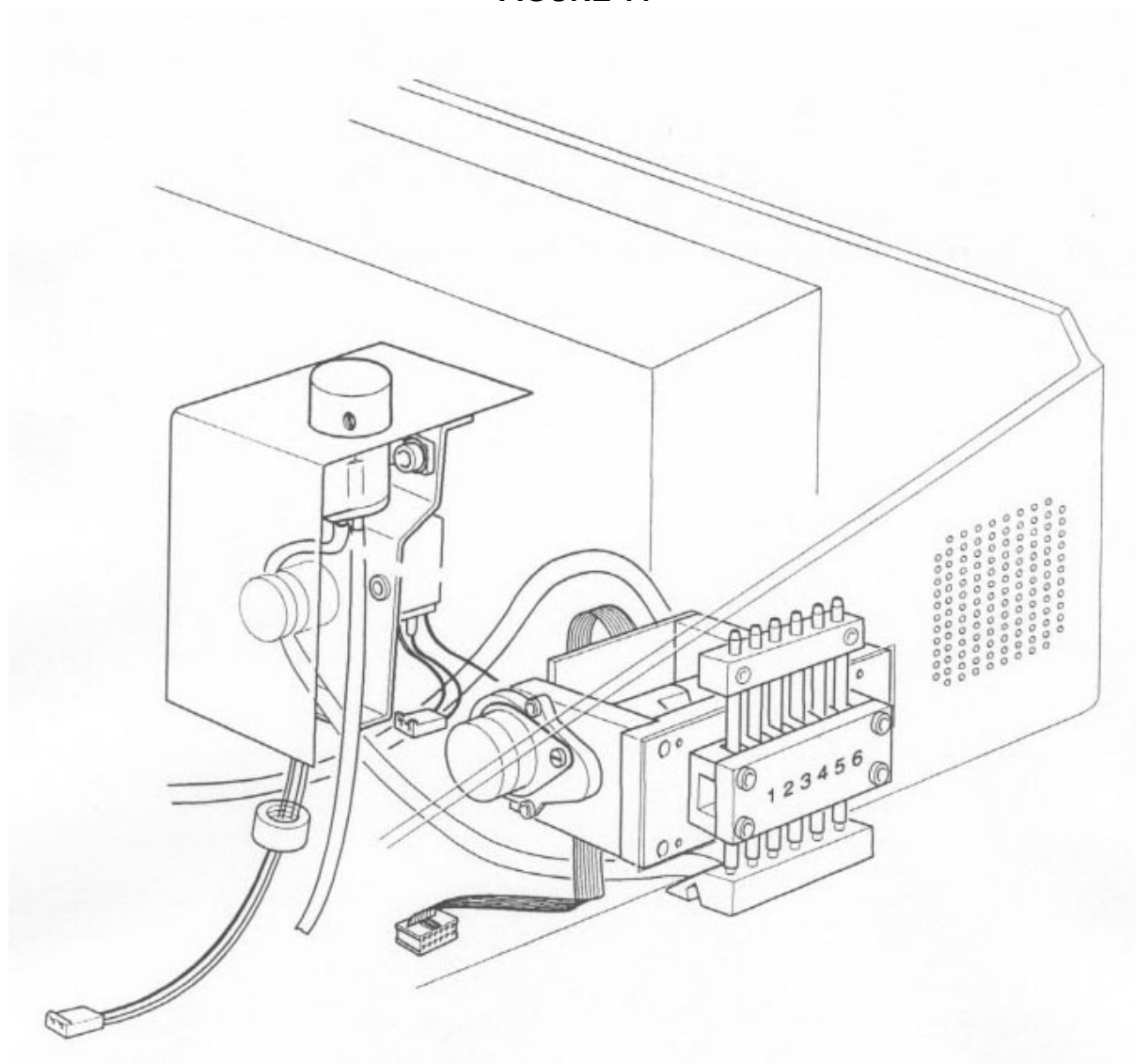


FIGURE 10





**FIGURE 11**





**FIGURE 12**

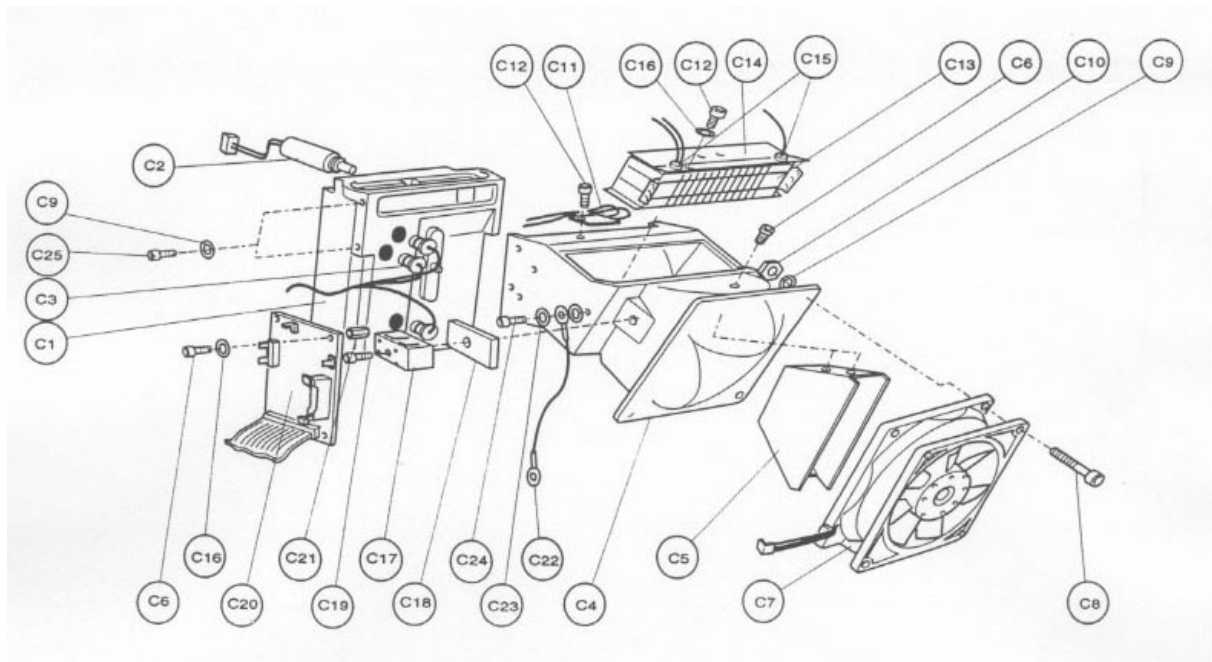
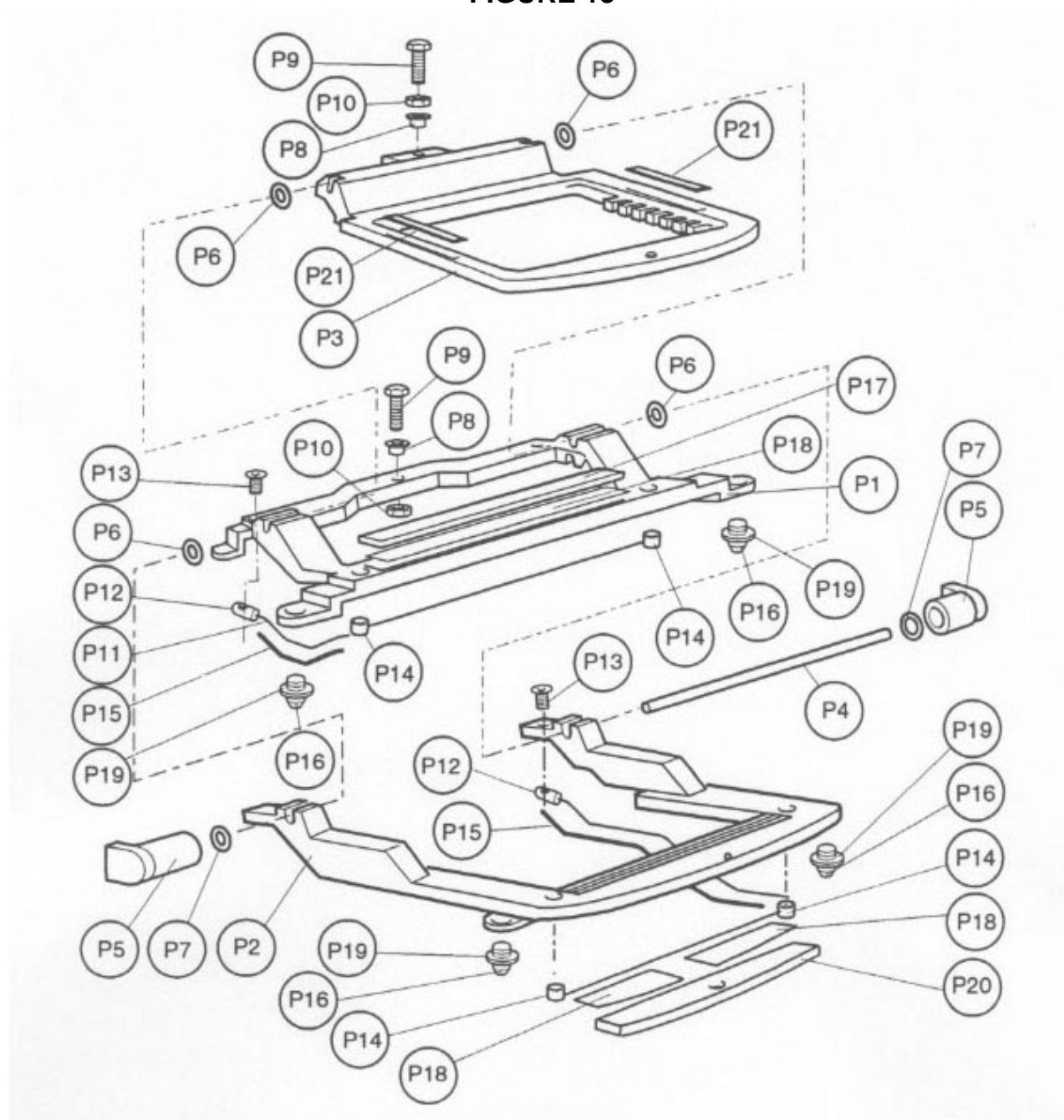
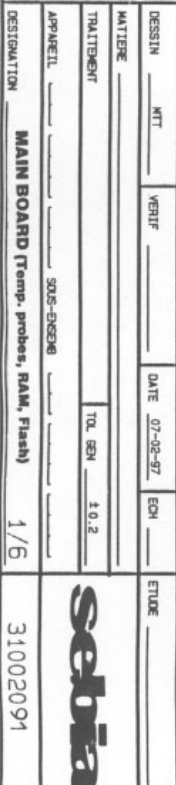


FIGURE 13



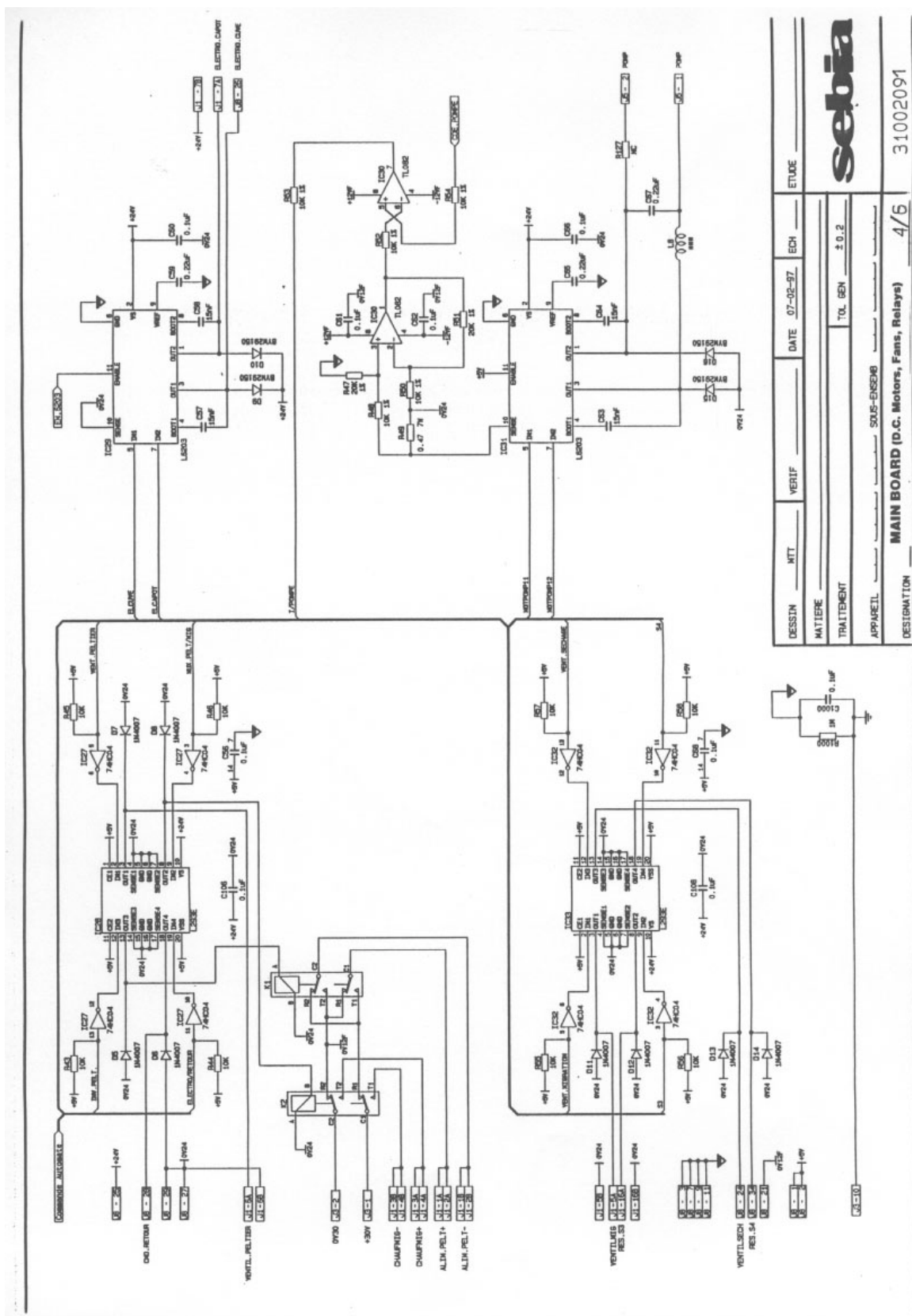
## **SECTION 13 : SCHEMATICS**











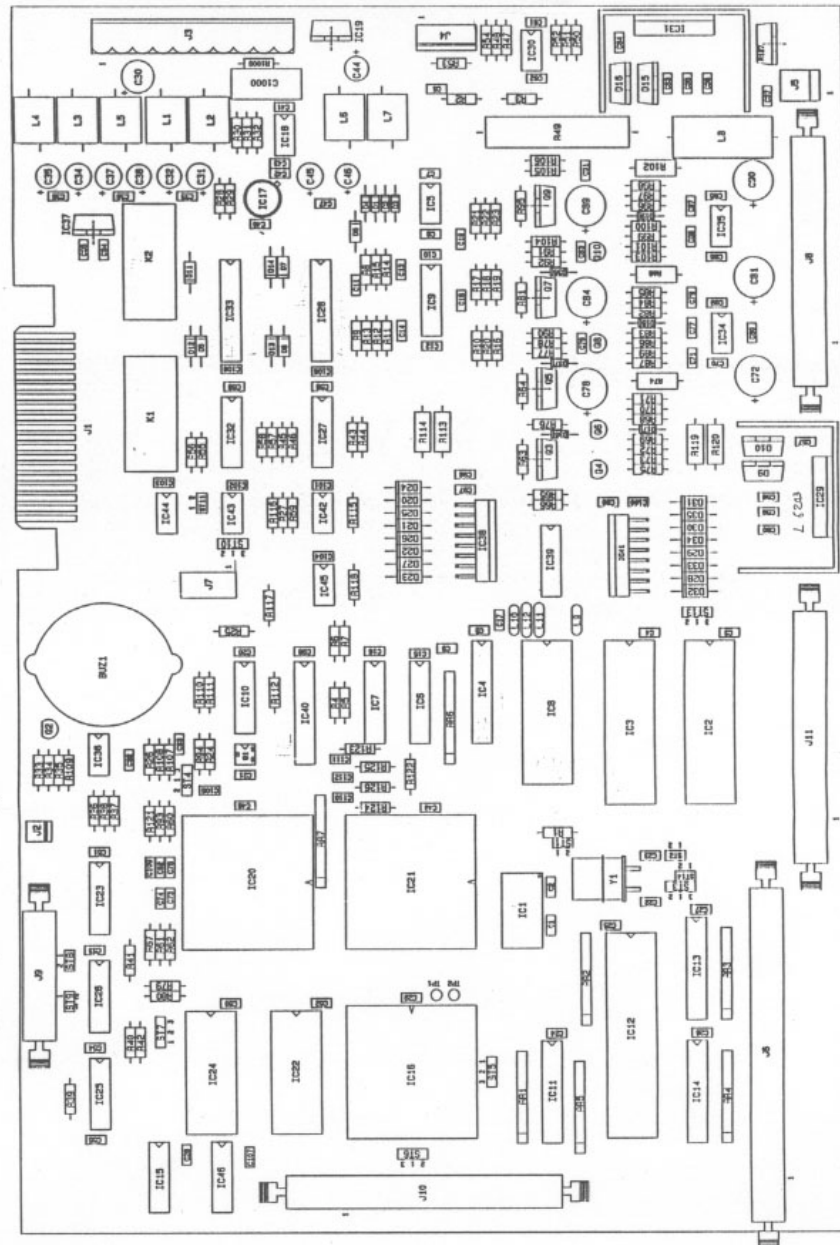
DESSIN	MTT	VERIF	DATE	07-02-97	ECH	ETUDE
MATIERE						
TRAITEMENT						
APPAREIL						
DESIGNATION	MAIN BOARD (D.C. Motors, Fans, Relays)					4/5
	SOS-ENSEN8					31002091
	TOL. GEN ± 0.2					

**sebia**





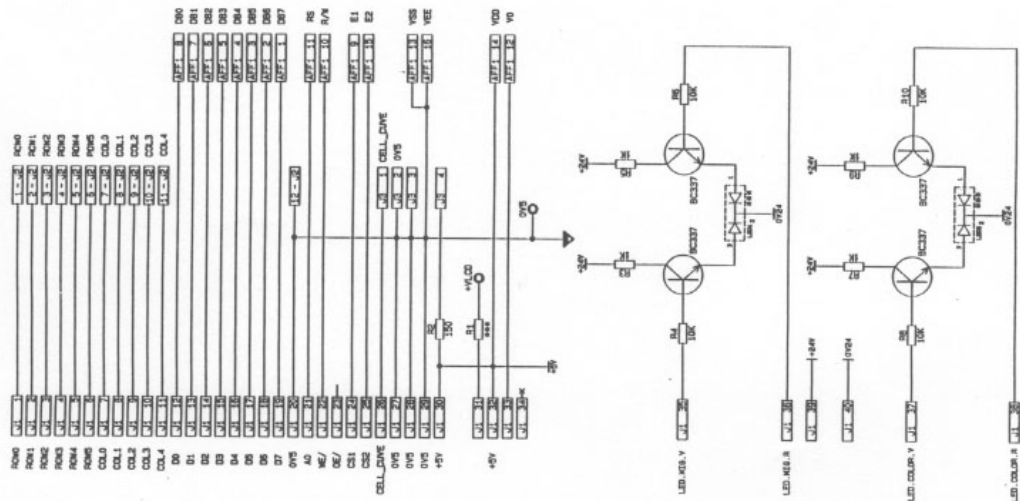




MAIN P.C. BOARD

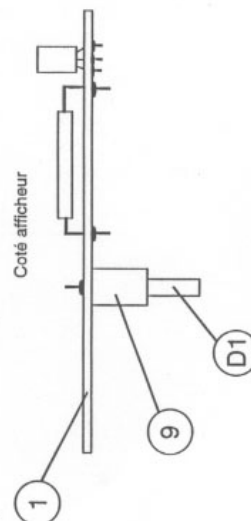
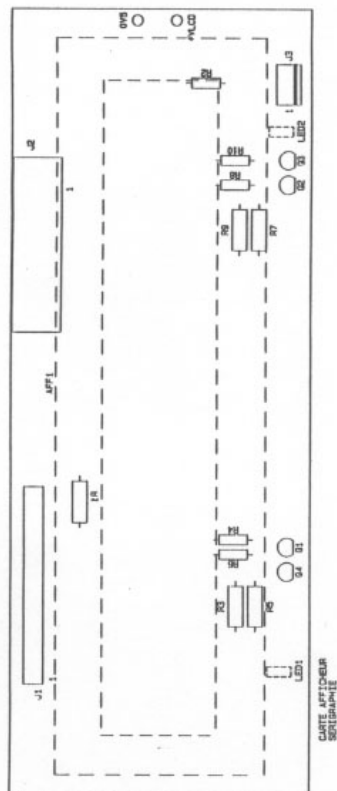






DESSIN	MTT	VERIF	DATE	15-12-95	ECH	ETUDE
MATIERE						
TRAITEMENT					TOL GEN	± 0.2
APPAREIL					SOUS-ENSEMB	
DESIGNATION	DISPLAY P.C. BOARD					1/1
	31 002 079					

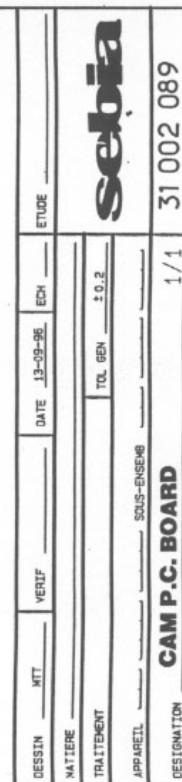
**sebia**



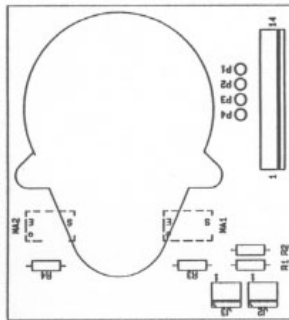
## MONTAGE DES LED1 ET LED2

REP	DATES	MODIFICATIONS		REP	DATES	MODIFICATIONS	
DESSIN	MIT	VERIF	DATE	24-09-96	ECH	1	ETUDE
MATIERE		TOL. GEN.		1/-0.2			
		3+3 1.5+2.0 8+1					
TRAITEMENT		V		XX			
APPAREIL		SOUS-ENSEMBLE					
DESIGNATION				DISPLAY P.C. BOARD			
				10 043 320			
CE DOCUMENT EST LA PROPRIETE DE SEBIA : IL NE DOIT ETRE REPRODUIT ET / OU COMMUNIQUE SANS SON AUTORISATION							





NOTE- MA1 ET MA2 SONT MONTES COTE SOUSCURE



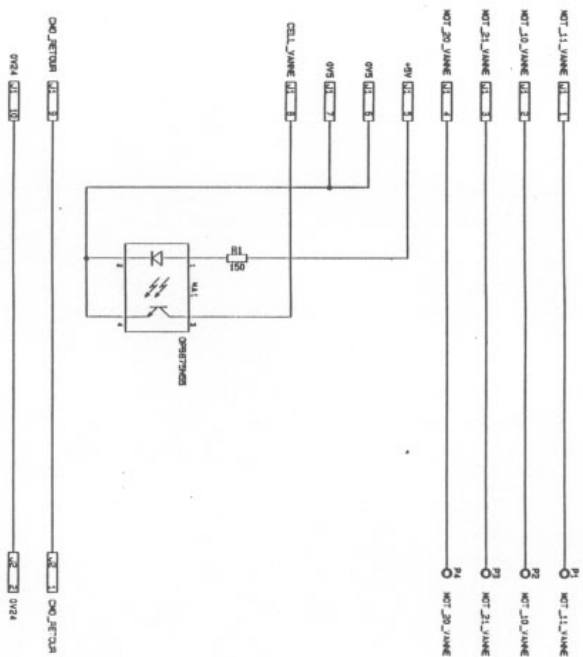
REP	DATES	MODIFICATIONS	REP	DATES	MODIFICATIONS
DESSIN	MTT	VERIF	DATE	10-12-96	ECH 1
MATIERE			TOL. GEN.	+/- 0.2	
TRAITEMENT			3-2-4.3	1-6-3.2.0 8-1.5	
APPAREIL	SOUS-ENSEMBLE		V	V	
CAM P.C. BOARD			10 043 511		
CE DOCUMENT EST LA PROPRIETE DE SEBIA. IL NE PEUT ETRE REPRODUIT ET / OU COMMUNIQUE SANS SON AUTORISATION					

**sebia**



REP	DATES	MODIFICATIONS	REP	DATES	MODIFICATIONS	
DESSIN	MTT	VERIF	DATE	09-12-98	ECH	1
MATIERE			TOL. GEN. $\pm 0,2$			
TRAITEMENT			3-2-4-3 1-5-2-2 (0-1-1-5)			
			V V V V V V V V			
APPAREIL			SOUS-ENSEMBLE			
DESIGNATION			MOTOR VALVE P.C. BOARD			
			10 043 541			

CE DOCUMENT EST LA PROPRIETE DE SEBIA - IL NE DOIT ETRE REPRODUIT ET / OU COMMUNIQUE SANS AUTORISATION



DESIGN	NTT	VERIF	DATE 03-09-96	ECH	ETUDE
MATIERE					
TRAITEMENT	TOL. GEN ±0.2				
APPAREIL	SOLUS-ENGINE				
DESIGNATION	VALVE P.C. BOARD				1/1
					31 002 090

**sebia**